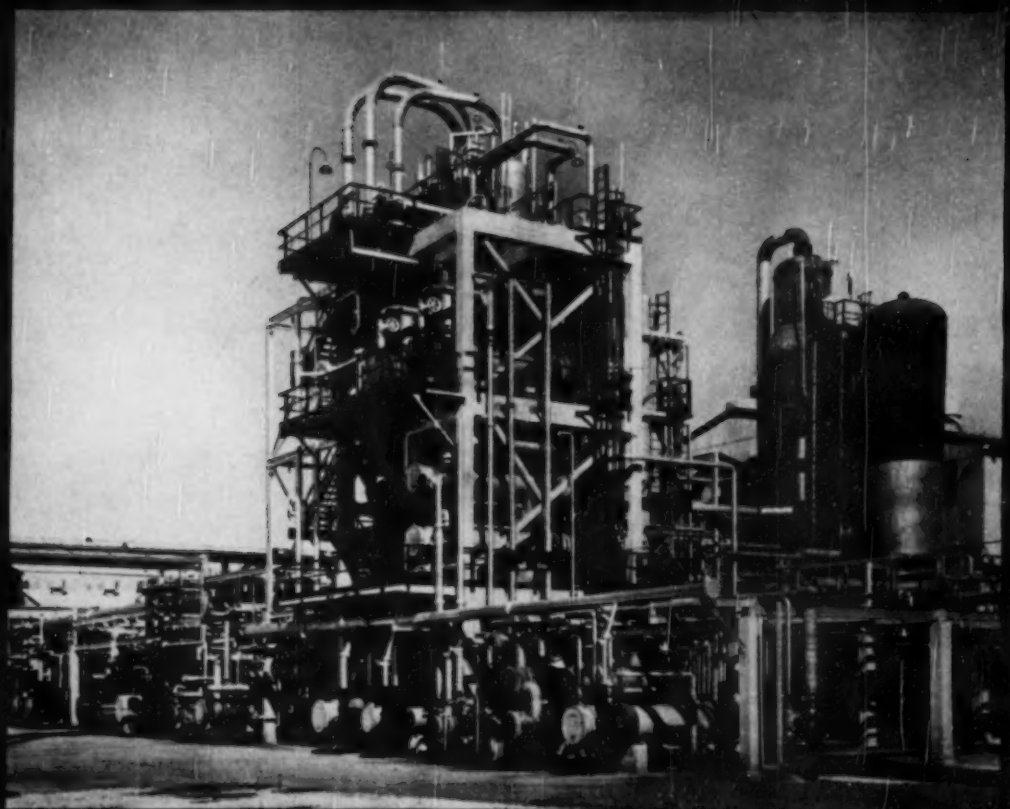
MARCH
1950

Chemical Engineering

WITH CHEMICAL & METALLURGICAL ENGINEERING



CIT CON'S BIG NEW LUBE OIL PLANT USES THESE HEAT EXCHANGERS IN MEK EXTRACTION FEATURE ARTICLE PAGE 94

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Fifty Cents

Chemical Engineering

WITH CHEMICAL & METALLURGICAL ENGINEERING

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Published monthly. Price 50 cents per copy. Address communications about subscriptions to J. E. Blackburn, Jr., Director of Circulation. Chemical Engineering with Chemical & Metallurgical Engineering. Subscription rates—United States and possessions: $3 per year, $4 for two years, $5 for three years; Canada: $4 per year, $6 for two years, $8 for three years (payable in Canadian funds); Pan American countries: $10 for one year, $16 for two years, $20 for three years; all other countries: $15 for one year, $30 for three years.

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Entered as second-class matter Sept. 3, 1936, at Post Office at Albany, N. Y., under act of March 3, 1879. Return Postage Guaranteed.

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Publication Office: 99-129 North Broadway, Albany 1, N. Y. Editorial and Executive Offices: 330 West 42nd Street, New York 10, N. Y. Cable Address: McGraw-Hill, New York. James H. McGraw (1860-1948), Founder; Curtis W. McGraw, President; Willard Chevalier, Executive Vice President; Joseph A. Gerardi, Secretary and Treasurer; Eugene Duffield, Senior Vice President, Publications Division; Nelson Bond, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Director of Circulation. Branch Offices: 520 North Michigan Ave., Chicago 11; 68 Post St., San Francisco 4; Aldwych House, Aldwych, London W. C. 2; Washington 4; Philadelphia 3; Cleveland 15; Detroit 26; St. Louis 3; Boston 16; Los Angeles 14; Atlanta 3; Pittsburgh 22; Houston 2.

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Reader Service

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Purpose of this new Reader Service Section is to make it easy for you to get more information from manufacturers. It applies to any advertisement and to the three editorial departments: Equipment News, New Products and Materials, Manufacturers' Publications. There is no charge or obligation.

WHAT IT CONSISTS OF

There are four parts. On the narrow pages following this one are (1) an index of products advertised in this issue, (2) an index of advertisers, (3) indexes of editorial items in this month's Equipment News, New Products, and Manufacturers' Publications departments. And (4) on the right are two postcards, one for you and a spare for a friend, on which to check the advertisements or editorial items that interest you. (Also on the heavy card insert is a list of articles published in this magazine and available in reprint form. They are listed there as a convenience; but their purchase must be by separate order to the editorial department.)

WHAT THE NUMBERS MEAN

Advertisements:—There is a number on the postcard for each advertisement in this issue. The numerals give its page number; the letters l, r, t, b (left, right, top, bottom) locate the ad on the page and so distinguish it from other ads on the same page.

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This is an index to three editorial departments. Numbers are page numbers; abc's distinguish between items where more than one is on a page. To get more information about new equipment or new products—or to get a free copy of a manufacturer's publication—check the item's number on the post card on your right. Use the numbers listed under "Editorial Items." Check as many as you like.

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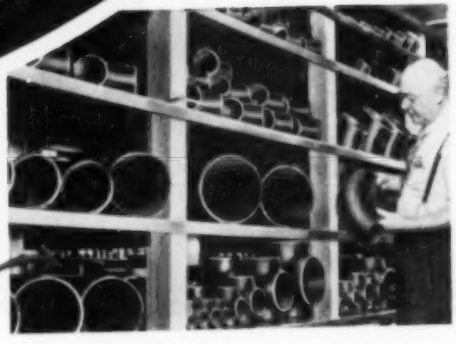

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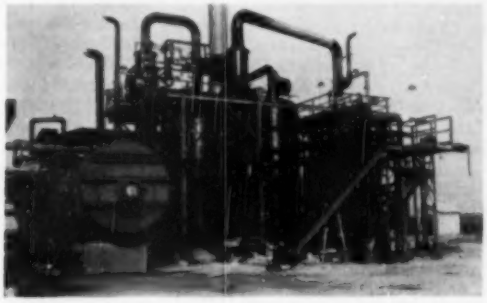
PACIFIC EDITION, CHEMICAL ENGINEERING . . . . PACIFIC COAST EDITOR: J. V. Hightower, *San Francisco* . . . . EDITORIAL ASSISTANT: Elizabeth Allen, *San Francisco*. . . . SPECIAL CORRESPONDENTS: W. S. Shamban, Kenneth D. Kahn, Jr., *Los Angeles*; Ray Bloomberg, *Seattle* . . . . MANAGING EDITOR: L. B. Pope, *New York*

Cooperation Lessens Smog Sulphur in Southern California

NOTE: *Our first three news stories this month detail the sulphur recovery systems of a number of companies. Cooperation is paying off by increasing available western sulphur and decreasing western smog.*—EDITOR.



Hancock now has two units like this.

Hancock Doubles Sulphur Recovery

About 20 mi. south of down-town Los Angeles, in the midst of a petroleum refining area, Hancock Chemical Co. plans to put on stream in March a new unit for the recovery of sulphur. This second unit, substantially like the first completed a year ago, doubles the plant capacity to 100 tons per day.

Hancock's plant, to which the raw material, hydrogen sulphide, is piped from several refineries, is doing a two-fold job: it furnishes a local source of sulphur for local sulphuric acid manufacture, and it is also a means of reducing the sulphur dioxide content of the often smoggy Los Angeles atmosphere.

General Petroleum Corp. has become the fourth contributing refinery to Hancock's "sulphur center" by completing a 8.5 mi. pipeline from the Torrance refinery to move hydrogen sulphide in diethanol amine solution to the plant. General Petroleum's gas is the feed stock for the new unit. Other refineries that have been sending the gas to the older unit at Hancock are those of the Texas Co., Tide Water Associated, and Richfield. Like General Petroleum, these refineries pass their gases through a water-amine solution in Girbotol units for absorption of the hydrogen sulphide, and then pipeline the mixture to Hancock Chemical.

Briefly to summarize the Hancock operation, which was described in PPI, Dec. 1948, the amine solution is freed of hydrogen sulphide by a conventional stripping tower and is then pumped back to the refineries. The hydrogen sulphide is partially burned with air to produce a limited amount of sulphur dioxide, which is then reacted catalytically with the remaining hydrogen sulphide to form water vapor and liquid sulphur. Tank cars carry the still liquid sulphur to local manufacturers of sulphuric acid.

One month before completion.

General Petroleum's Sulphur System

A description of the new $600,000 system which General Petroleum Corp. has installed at its Torrance, Calif., refinery, near Los Angeles, shows what type of equipment is involved in trapping hydrogen sulphide from refinery gases and moving it to Hancock Chemical Co.'s sulphur recovery plant. General's project almost completely prevents the burning of hydrogen sulphide in the refinery's gas fuel and therefore substantially eliminates the introduction of sulphur dioxide into the atmosphere.

First stage is a gas collection system to bring to a central point in the refinery all gases later to be burned as fuel, including some liquefied petroleum gases. Second step in the process is the absorption phase. Here, about 25 million ft. of gas per day enters the base of a bubble tray column 65 ft. high and 7 ft. in diameter and moves upward through a 20 percent solution of diethanol amine in water introduced near the top of the column. At the same time the LPG fraction to be treated is pumped, in liquid form, at the rate of about 252,000 gal. per day into the bottom of a Raschig-ring-packed absorber 45 ft. high by 5.5 ft. in dia., in which amine solution is flowing downward. The gas is subjected to a final water wash before emerging from the respective absorber. A total of about 125,000 lb. of hydrogen sulphide is absorbed per 24-hr. day.

The bubble tray column operates at 120 psi.; the treater for the LPG operates at 260 lb. Both absorptions

are carried out at atmospheric temperature. Carbon steel equipment is used, no corrosion being expected. E. B. Badger designed and built the equipment.

The hydrogen sulphide-containing solution is then fed by centrifugal pump into a 10-inch pipeline and moved at the estimated average daily rate of about 650,000 gal. a distance of 8.5 mi. to the Hancock Chemical Co. sulphur plant, is stripped of the hydrogen sulphide there and returned by pipeline to Torrance. This pipeline system is built of welded steel sections and is protected underground by somastic and by a light oil spray above ground.

General Petroleum's expenditures on smoke, fume and odor control now total over $1,100,000.

Union Trucks Sulphide to General

Union Oil Co., at its Wilmington refinery, near Los Angeles, has completed a $400,000 installation that is a substantial contribution to the drive by refineries in that area to reduce the amount of sulphur dioxide reaching the atmosphere from sulphur-containing gases burned as fuel, and at the same time to put that otherwise troublesome sulphur to good use. Union's equipment for absorbing hydrogen sulphide from its refinery fuel gases will go into operation this spring after General Chemical Co. has completed an expansion program at El Segundo to convert the product into sulphuric acid.

The tie-in between Union and General Chemical is novel in that the hydrogen sulphide will be transported in an amine solution by tank truck instead of being pumped by pipeline, the method used by Hancock Chemical and its contributing refineries. Decision to use trucks was reached because the unusually long distance between Union and General Chemical—some 20 mi.—would have called for a large pipeline investment.

The arrangement in the Wilmington refinery is to absorb hydrogen sulphide from a mixture of refinery fuel gases and some liquefied petroleum gas fractions in a Girbotol unit using a water solution of diethanol amine as the absorbent. The DEA solution is then stripped of its hydrogen sulphide in the refinery and the gas is re-absorbed into monoethanol amine (about 100 percent strength) because the high absorptive capacity of this amine reduces the volume of liquid to be trucked.

Harvey Plans Aluminum at BMI

An executive of Harvey Machine Co., fabricator of aluminum products at Torrance, Calif., says that the firm has signed an agreement with the Nevada Colorado River commission to bring Harvey into the lists of primary aluminum manufacturers with a plant to be built on the former Basic Magnesium site near Henderson, Nev. Planned annual capacity of the project is 35 million pounds as a minimum, with a maximum of 105 million pounds, the higher figure applying if power adequate for that amount can be arranged.

The contract covers the purchase of 200 acres of land for the installation of buildings and equipment for primary aluminum production as well as a rolling mill. Company engineers are working on construction plans, with work scheduled to begin in a few months. Completion of the work is expected in about 19 months. Present intention is to obtain bauxite from Arkansas and Surinam, with alumina to be manufactured from the ore in a plant in Alabama which will be partly owned by Harvey Machine Co.

The company plans to manufacture its own carbon electrodes at Henderson. A portion of the aluminum will be used by the company for its fabrication operations at Torrance, with the remainder being sold. Other than processing its own aluminum the Torrance plant will not be otherwise affected.

Lawrence A. Harvey, executive vice president, said several weeks ago that although the firm had been discussing with government officials the idle aluminum reduction plant at Riverbank, Calif., which Alcoa leased during the war, no arrangement had been reached for purchase of the potlines or other equipment for removal to Henderson. The Riverbank plant has three potlines of 128 pots per line. Total rated aluminum capacity is about 110 million pounds per year, which is practically the same capacity named as the maximum output that Harvey has been considering for the Henderson project.

Newcomers for Henderson

It was a virtual certainty several weeks ago that two other companies in addition to Harvey Machine Co. will join the growing industrial colony at Henderson, Nev. Following several months of negotiations, contracts were "agreed to" between the Colorado River Commission and (1) Combined Metals Reduction Co. and (2) National Lead Co., with every indication that the agreements would be formalized in February or early March.

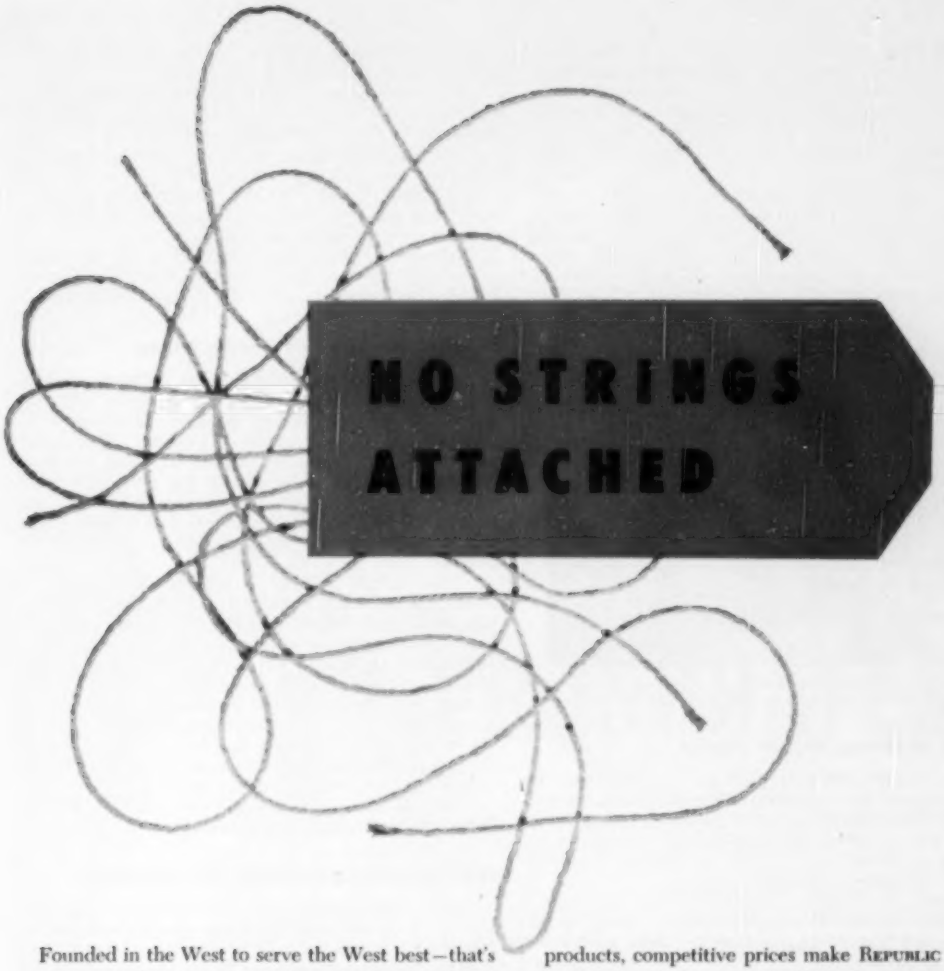
Plans of Combined Metals call for construction of facilities at Henderson to produce oxides of lead, zinc and manganese, as well as metallic lead, from complex oxidized ore produced in the Pioche area. The ores would first be concentrated at the initial rate of 330 tons per day in a new plant to be erected at Caselton, Nev. The company has been investigating an electrolytic process for utilizing oxidized ores hitherto regarded as unprofitable but which exist in large reserves. National Lead Co.'s interest is the production of titanium, but the company has disclosed no details.

L. A. Chemicals Code Soon Effective

A far-reaching system of regulations, considered to be the most comprehensive of its kind ever applied in any city, is expected to go into effect this month or in April in Los Angeles. It is the city's Dangerous Chemicals Code. It is going to affect the transportation, storage, use and processing of a host of materials handled by the chemical manufacturing and processing industries, including petroleum refineries. The code is the outgrowth of the devastating explosion early in 1947 at the O'Connor Electro-Plating Co. The city passed an ordinance after the explosion, establishing an extensive system of reports to be filed with the Fire Department and at the same time directing that department to undertake the formulation of the code, as well as to issue permits only after its provisions have been carried out.

The three-year task has been a cooperative job involving specialists in the Fire Department; committees organized by the Los Angeles Chamber of Commerce which included authorities from a wide range of private industry, associations and schools; and various other local and national organizations having basic interests in the development.

Through the work of six of the committees, approximately 1,100 products have been classified in the following groups; corrosive liquids, oxidizing chemicals, dangerous gases, flammable solids, explosives and violent reactors, and flammable liquids. Listing of chemicals under any one group is subject to review and revision.



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In general, instructions for each of these groups cover, either on a recommended or stipulated basis, the following subjects: primary commercial manufacture, handling, containers, storage, safety precautions, and use and processing. Other sections of the code contain provisions relating to transportation and to laboratory and experimental practices.

A chapter on general conditions covers the issuance of permits to use, process, produce, store or transport dangerous chemicals in amounts in excess of those specified in sections on the six basic groups mentioned above; reports to be made; segregation of and quantity limits on chemicals; containers and labels. The code is retroactive.

Manager G. F. Wilkins, President C. T. Gates, and Oliver horizontal filter in the Gates triple superphosphate plant.

Gates Making Triple Super

At Wendell, Idaho, Gates Bros., Inc., has begun the manufacture of triple superphosphate and phosphoric acid by a modified continuous process involving unusual applications of a special cone mixer for the rock and phosphoric acid and an Oliver horizontal filter for removal of gypsum from the phosphoric acid slurry.

George F. Wilkins, general manager, says that a 97 percent recovery of phosphoric acid is being accomplished, and that strong acid from the filter averages 32 percent phosphoric acid.

Chemical Construction Corp. of New York is constructing a $50,000 submerged combustion evaporator that will produce 75 tons per day of 54 percent acid. The evaporator, first of its type to be installed in the West, is scheduled to go into operation around June.

Production of triple superphosphate is moving out through distribution offices of the Idaho Farm Bureau, the exclusive marketing agency for the plant. Average output of the granulated product has been 75 tons daily.

Charles T. Gates is president. G. H. Lewis is chief chemist and is in charge of technical operations of the plant.

Laucks Producing Epsom Salts

Laucks Chemical Co., Seattle, is mining and manufacturing epsom salts, agricultural grade, from an epsom salts deposit near Tonasket, Wash., previously owned and operated by C. A. Kearney. The deposit is substantially pure salts, ranging between 96.5 to 99.5 percent, the residue consisting of gypsum.

Located in a natural basin, the reserve consists of a salts crust deposit covering several acres. The crust is broken and conveyed by dragline to a rotary dryer. No additional processing is needed. The material is sacked into 100 lb. multi-wall bags for shipment.

At present, markets for the product are largely among fertilizer manufacturers, and growers, with occasional shipments to the Chelan mining area for use in ore processing. Current estimated annual production is about 6,000 tons.

Laucks Chemical Co. also manufacturers sampling equipment for the vitamin oil industry, bactericides, cleaning agents, and beverage mixes.

Manager of the Tonasket Division is Les Hefferline. In addition to Hefferline, company executives include I. F. Laucks, chairman, and J. M. Kniseley, president.

Hooker Expands Caustic Plant

Hooker Electrochemical Co. has disclosed plans to double the capacity of its electrolytic caustic plant at Tacoma by modernizing and expanding facilities. It is supposed the cost will exceed $1 million. Hooker has undertaken the expansion program in order to meet growing needs of present customers and prospective additional caustic and chlorine requirements from new pulp mills in the Northwest. Completion of the work, which is in charge of the company's engineering staff, is set for October.

Two circuits of Type E cells will be replaced by latest Type S-3 cells. The new cells, of Hooker design, have considerably higher capacity than the old equipment. New equipment will be installed for handling and treating brine, purifying caustic for rayon-grade pulp and liquefaction of chlorine. Other facilities will include a new building for construction and maintenance of cells, more storage tanks, a new boiler and expanded pier facilities.

Hooker's new customers include Columbia Cellulose Co. and the Nanaimo Sulphate Pulp Co., both in British Columbia, which will be supplied by barge.

The Tacoma plant, managed by J. D. Rue, also produces muriatic acid and hydrogenated fats and oils.

Raw Materials Survey to Continue

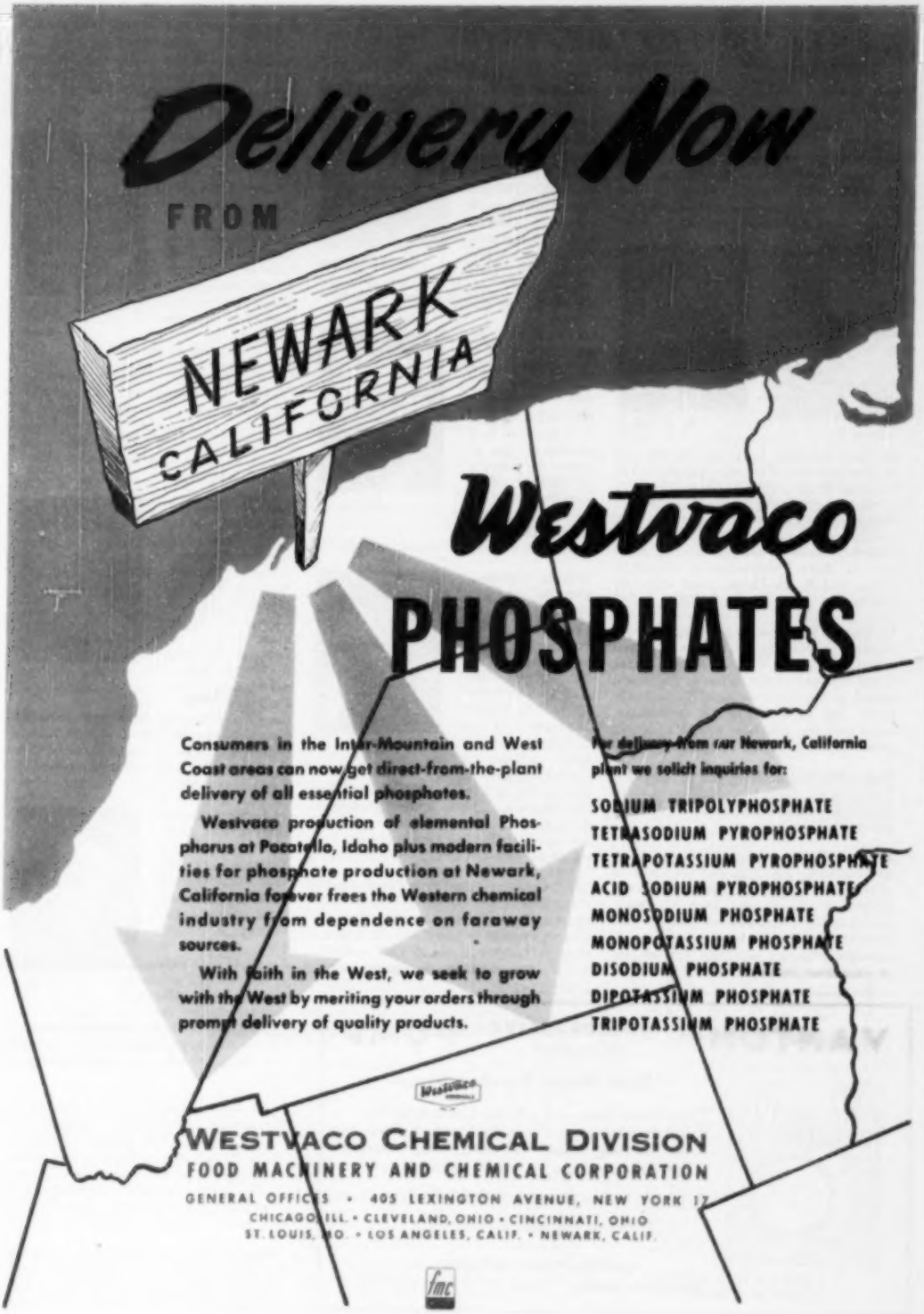
Raw Materials Survey, Inc., of Portland, is apparently assured of funds from sponsoring agencies sufficient to continue its services for another three years. Established in 1947 to serve as a clearing house for information on raw materials for industries in the lower Columbia river basin, the survey is supported by industries, municipal agencies, utilities, banks and chambers of commerce in the region.

Directors of Raw Materials met in February to discuss present projects and a program for this year. A. O. Bartell continues as managing engineer.

Hancock May Make Glycol

Thus far the West has no manufacturer of ethylene glycol, but Hancock Chemical Co., Long Beach, Calif., was about to decide last month on whether it will become the first. Hancock has received from E. B. Badger & Sons Co. and its own engineers information on which to base a decision. Tentative plans contemplate a unit having a manufacturing capacity of 60,000 lb. per day.

For some time the company, which is situated in a vicinity where a supply of ethylene is available from several petroleum refineries, has been contemplating the step. The firm considers that with respect to existing plants manufacturing the glycol it is in an attractive competitive position as regards western markets for the product, major part of which goes into anti-freeze outlets.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NAMES IN THE WEST

Fred Sawyer, who in 1946 became the American Chemical Society's associate editor, in San Francisco, of *Industrial & Engineering Chemistry* and *Chemical & Engineering News*, has resigned from his ACS position. He has joined Stanford Research Institute, Stanford, Calif., to take part in the administration of the institute's air and water pollution program.

T. N. Bland

T. Noel Bland has been elected president of Fibreboard Products Inc., succeeding **D. H. Patterson, Jr.**, resigned. **R. B. Knott**, controller, occupies the newly created office of vice president in charge of finance.

O. Harry Schrader, Jr., is the new director of Douglas Fir Plywood Association at Tacoma, Wash., following his resignation as director of the Washington State Forest Products Institute.

Fred J. Drewes is now foil division manager of Kaiser Aluminum & Chemical Corp., and **R. D. Harris**, plant engineer, has become plant superintendent.

C. Stewart Ferguson, engineering manager of General Electric Co.'s chemicals division at Troy, N. Y., has become West Coast manager of the division. He is stationed in the divison's plant at Anaheim, Calif. and is in charge of engineering, manufacturing and sales of the division's products on the West Coast.

Roger W. Truesdail, president, Truesdail Laboratories, Inc., Los Angeles, is new president of American Council of Commercial Laboratories.

Reese H. Taylor, president, Union Oil Co. of California, was re-elected president of Western Oil & Gas Association, headquarters at Los Angeles. **John M. Peirce**, who has been executive secretary of the association, is vice president and general manager following abolition of the post of executive secretary.

L. Koenig

Louis Koenig is first to occupy the newly created post of assistant director of research at Stanford Research Institute, Stanford, Calif. Dr. Koenig's former connections included Armour Research Foundation, Solvay Process Co., Lithaloys Corp., and Atomic Energy Commission.

C. F. Park, Jr.

Charles F. Park, Jr., is the new dean of the school of mineral sciences, Stanford University, Stanford, Calif. Dr. Park replaces **A. I. Levorsen**, who remains as professor of geology. Park, formerly with the U. S. Geological Survey, is a specialist in metallic ores and economic geology.

W. W. Mein, Jr.

William Wallace Mein, Jr., vice president, Calaveras Cement Co., San Francisco, is named to membership on the National Minerals Advisory Council by U.S. Interior Secretary Oscar Chapman. Mein has been secretary of the California State Mining Board since 1944. He is western vice chairman of the industrial minerals division of the American Institute of Mining and Metallurgical Engineers; also vice president, Bishop Oil Co., San Francisco.

W. I. Cole has retired from Owens-Illinois Glass Co., where he has been vice president and general sales manager. He will continue active in San Francisco business through Lambert, Cole & Co., manufacturers' representatives, 391 Sutter St.

Frank L. Smith has become general manager of Mt. Baker Plywood, Inc., at Bellingham, Wash., following 22 years of service with Peterman Plywood Manufacturing Co., Tacoma, Wash., as manager and superintendent.

H. E. Bramston-Cook

H. E. Bramston-Cook, who joined Oronite Chemical Co. in 1946, has been named a vice president of the firm. He will continue in New York City as Oronite's general manager in charge of sales and product development for the company's operation in the East.

C. F. Trombley, formerly Monsanto Chemical Co.'s branch manager at Seattle, has become general branch manager in the company's Western Division office at San Francisco. **A. W. Hempelmann**, previously at San Francisco, succeeds Trombley at Seattle.

J. R. Nail

John R. Nail, former manager of the Pacific Zone, Agricultural Chemicals Division, Sherwin-Williams Co., has joined the Grasselli Chemicals Department of E. I. du Pont de Nemours & Co. as agricultural technical service representative in the San Francisco Bay area. **John H. Couch**, previously associated with Nail in the Pacific Zone, has taken a similar position with Du Pont and is stationed at Hood River, Ore.

A. L. Snow

A. L. Snow has become a vice president of California Research Corp. and also manager of the firm's patent department. Snow, who became senior patent attorney in charge of chemicals at the end of 1944, succeeds **J. N. Adams**, who has retired. Other patent department changes include the appointments of **O. S. Loud** and **H. B. Wands, Jr.**, as assistant managers.

E. D. Mains, former assistant manager at the Massena, N. Y., works of Aluminum Co. of America, has become manager of the wire, rod and cable mill now under construction by Alcoa at Vancouver, Wash. **R. W. Knapp**, previously a superintendent at Alcoa's plant at Newark, Ohio, is assistant works manager at Vancouver.

James L. Taylor, previously chief engineer for the potash mine and refinery of International Minerals & Chemical Corp., Carlsbad, N. M., has become construction

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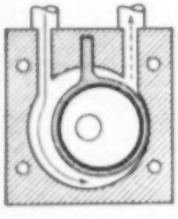

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engineer for the entire organization. He has been transferred to company headquarters at Chicago. He was responsible for the Carlsbad installation, the phosphate flotation plant at Mulberry, Fla., and layout and design of other company facilities.

Paul E. Cooper, president, Pacific Mills, Ltd., has been elected chairman of the Western Branch, Canadian Pulp & Paper Association, for his second term. **Harold S. Foley** is vice chairman.

Myron A. Bantrell, president of Filtrol Co. of California, has been elected chairman of the board of directors of Filtrol Corp. of Delaware. **Donald Royce,** president of William R. Staats Co., was elected a director.

Paul S. Brallier has become director of market development for Stauffer Chemical Co. Quartered in Stauffer's Los Angeles offices, he will act as liaison between the firm's research and sales departments regarding chlorine and alkalis. **Thomas P. Turcham,** former superintendent at Stauffer's Henderson, Nev. plant, succeeds Brallier as manager of Stauffer's plant at Niagara Falls, N. Y.

William E Quay, previously assistant plant manager of M. & M. Wood Working Co.'s fir plywood plant, Albany, Ore., is now manager of the firm's redwood plywood operations at Eureka, Calif. He succeeds **Elmer Hall,** resigned.

J. J. Vezzetti has become president of Sunset Oil Co., succeeding **T. F. Fournier,** now chairman of the board.

Delbert E. Jack has resigned as vice president in charge of engineering and sales for Duriron Co., Inc., and has returned to Los Angeles to establish his own firm as manufacturers' agent. He remains on the board of directors of Duriron, and is retained by Duriron as its West Coast technical director.

Robert L. Burk, technical sales engineer for National Starch Products Co., has been transferred by the firm from its San Francisco laboratory to the company's headquarters at Los Angeles.

R. G. Follis, vice chairman and former president of Standard Oil Co. of California, has been elected chairman of the board following the resignation of the chairmanship by **H. D. Collier.** Collier continues as a director and chairman of the finance committee.

Lewis P. Harris, for some years in charge of research work at Oakland, Calif., in the Agricultural Chemicals Division, Sherwin-Williams Co., is now manager of the Insecticide Division of Cotton States Chemical Co., West Monroe, La. At the time he left Sherwin-Williams he was in charge of the central research department at Cleveland, Ohio.

Collis C. Bryan, research group leader, Monsanto Chemical Co., Seattle, Wash., is new chairman of the Puget Sound section of American Chemical Society.

FIRMS IN THE WEST

General Electric Co. has been recruiting chemical engineering students and recent graduates for a rotational training course in the company's Hanford Works at Richland, Wash. Technical work offered in the 9 to 18-month course can be applied for graduate or undergraduate credit at the Universities of Idaho, Oregon and Washington, also Washington State.

Soundview Pulp Co., Everett, Wash., has awarded contract for construction of an air-conditioned concrete and masonry building to house a research and technical control laboratory.

Lyle Branchflower Co., Seattle, manufacturer of vitamins and other products from fish, expected to begin operations during this month or April in a new plant the firm has built to replace a structure destroyed in a fire during 1948.

Aluminum Co. of America has taken up options on substantial acreage at Dyea and Skagway, Alaska, according to the Alaska Development Board, and is understood to be considering construction of an aluminum plant.

Union Oil Co. has begun construction of the recently announced $5 million research center at Brea, Calif. Completion is scheduled for July 1951.

Spicer-Gerhart Co., Pasadena, Calif., until recently a manufacturer only of ethylene disulphonate at its Sunland, Calif., laboratory, is now also producing crystalline chymotrypsin, crystalline amylase and sirup leptol.

Hathaway Allied Products Co., manufacturer of gums and crude botanicals, has occupied new headquarters at 2024 Westgate Ave., Los Angeles.

Reynolds Metals Co. has awarded contracts for elimination of fumes escaping from its aluminum plant at Troutdale Ore. The project includes installation of washing towers and dust collectors, hoods for aluminum furnaces and reconstruction of roofs.

California Spray Chemical Corp., manufacturer of oil sprays and other agricultural chemicals, plans a $150,000 processing plant near St. Louis, Mo.

Economics Laboratory, St. Paul, Minn., has completed near Santa Clara, Calif., a $150,000 plant to produce a line of industrial and household detergents from purchased phosphates, metasilicates, soda ash and caustic. Plant manager is William Beyer.

Salt Lake Pipe Line Co. has awarded contracts for construction of a 240-mi. pipeline from Boise, Idaho, to Pasco, Wash. This is an extension of the Salt Lake City-Boise line begun last year to carry products from a refinery in Salt Lake City. The extension will serve Standard Oil Co. of California's distributing stations.

R. T. Collier Corp., Los Angeles, is in full-scale production of active carbon at the plant near Santa Clara, Calif., which the company completed last year. The product, made from fruit pits and nut hulls, can be turned out at the rate of several tons per day. Other products are dense raw charcoal, wood tars, organic sulphides and pyroligneous acids.

V. F. Duensing

Central Scientific Co. has purchased the Redman Scientific Co. at San Francisco and the Pacific Laboratory Apparatus and Chemical Co. at Los Angeles. These two new divisions of Cenco maintain warehouse stocks and sales offices at both locations and are operating as the San Francisco Branch and the Pacific Laboratory Division. V. F. Duensing is in over-all charge of Central's California Companies. J. R. White is operations manager at San Francisco. R. D. Gwynne is manager at Los Angeles.

Western Electrochemical Co., world's largest manufacturer of chlorate and perchlorate chemicals (plant at Henderson, Nev.) has moved headquarters from Los

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PROGRESSIVE CHEMISTRY FOR A CENTURY

Angeles to 2205 Russ Bldg., San Francisco. Closer proximity to major business connections was reason for the change. The firm's research laboratory near Los Angeles will remain there. Kenneth Walsh is president and C. M. Johnson is office manager, both being in San Francisco.

W. P. Fuller Co. has bought Sound Paint Manufacturing Co. at Seattle, Wash., and has named the Seattle firm as Sound Paint Manufacturing Co., Industrial Division, W. P. Fuller Co. A plant expansion at Seattle is contemplated.

Silver & Co., exporters and importers, San Francisco, has brought from Japan as special assistant T. Kagawa. He was prewar representative in San Francisco of the now liquidated firm of Mitsui Bussan Kaisha. Kagawa, with a background of chemicals, is Silver's general adviser on Japanese and other oriental markets. Prior to the war, Silver & Co. was Mitsui's broker in San Francisco. Kagawa is head of Metro Trading Co., a Japanese group organized about three years ago in Japan by former Mitsui men. Metro represents Silver & Co. there.

American Sugar Refining Co. has purchased from Blair Holding Corp. 150,000 shares of stock representing 41 percent of the outstanding stock in the Spreckels Co. of San Francisco, which in turn owns 50 percent of Spreckels Sugar Co. Spreckels Sugar has three beet sugar refineries in California.

Thermal Products, Inc., Los Angeles, has become distributor for Mills Industries, Inc., as representative of the Mills line of condensing equipment and compressors in southern California. Thermal Products President Peter Askew was formerly general manager of Refrigeration Supplies Distributors at Los Angeles.

Harold L. Heakin Co., offices in San Francisco and Los Angeles, has become sole representative in California for Mixing Equipment Co.'s Lightin and Mixco mixers. Heakin furnishes technical services related to liquid mixing and blending.

H. L. Heakin

Crown Zellerbach Corp., San Francisco, has made extensive changes in managerial positions in its pulp and paper mills at Lebanon and West Linn, Ore., and Port Angeles, Wash. P. T. Sinclair, resident manager, West Linn, is promoted to staff assistant of manufacturing in San Francisco. Malcolm Otis, resident manager at Port Angeles, succeeds him at West Linn. Ray Schadt, resident manager at Carthage, N. Y., is now resident manager at Port Angeles; G. H. Gallaway, formerly resident manager at Lebanon, replaces Schadt at Carthage. Herbert Wymore, formerly on special assignment at Lebanon, has become acting resident manager at Lebanon.

Pacific Tank & Industrial Coating Co., and **W. S. Shamban & Co.**, both at Los Angeles, have installed equipment and services to apply Teflon coatings on pipe, tanks, valves, rolls and other facilities requiring corrosion-resistant and non-wetting surfaces. Shamban handles Pacific's engineering and sales.

Stancal Asphalt & Bitumuls Co., subsidiary of Standard Oil Co. of California, plans to complete this spring a new asphalt refinery at Point Wells, Wash., to meet increasing demands for asphalt products in the Pacific Northwest.

Fluor Corp. has completed at Los Angeles a $300,000 plant expansion. Major project was an engineering building to bring together engineers previously scattered in small temporary quarters.

Stauffer

Fleets of Stauffer tank trucks are now available to deliver industrial acids in bulk in California and the Pacific Northwest.

Bulk deliveries save on initial cost of commodities, lower freight charges, lower cost of handling, and elimination of lost time accidents through careless handling of drums or carboys. The Stauffer Chemical Company has pioneered the tank truck method of bulk delivery on the Coast.

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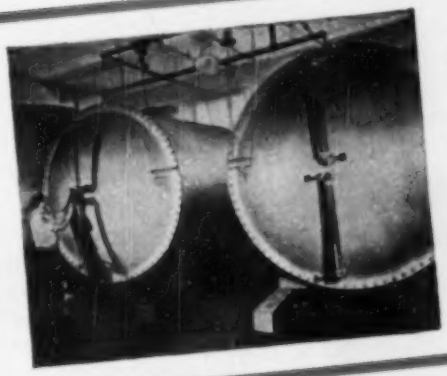

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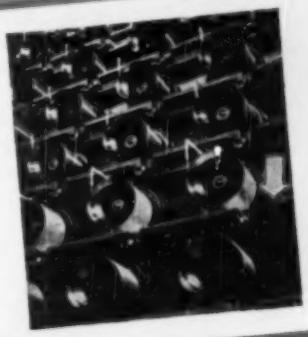

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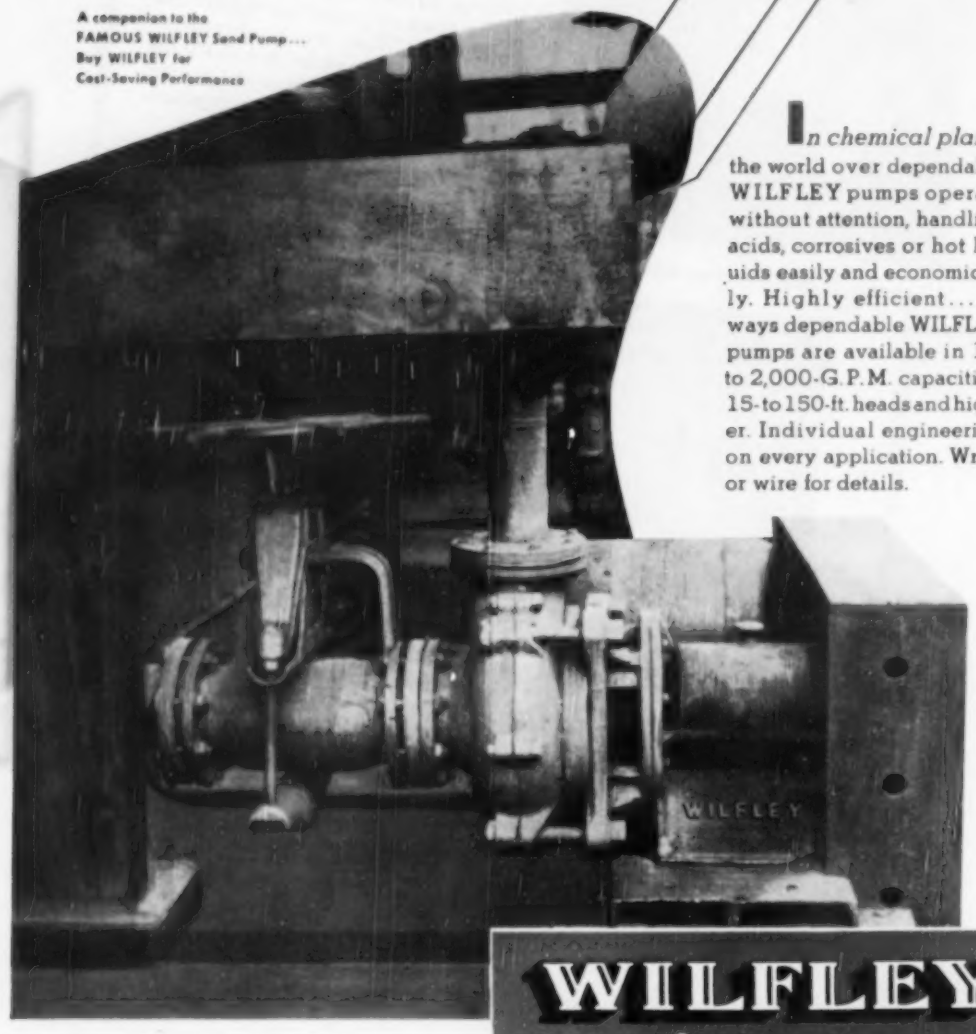
The hydrochloric leaching solution used at a West Coast plant required special handling. WILFLEY engineers recommended the WILFLEY Model AC plastic lined acid pump illustrated below. Today...this pump delivers continuous, trouble-free performance—with minimum loss due to corrosion.

A companion to the FAMOUS WILFLEY Sand Pump... Buy WILFLEY for Cost-Saving Performance



In chemical plants the world over dependable WILFLEY pumps operate without attention, handling acids, corrosives or hot liquids easily and economically. Highly efficient...always dependable WILFLEY pumps are available in 10- to 2,000-G.P.M. capacities. 15- to 150-ft. heads and higher. Individual engineering on every application. Write or wire for details.

A. R. WILFLEY & SONS, Inc.
Denver, Colorado, U.S.A.

New York Office: 1775 Broadway, New York City

WILFLEY *Acid* PUMPS

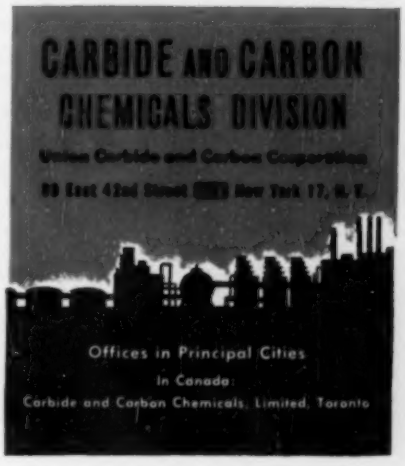
CARBIDE now offers Maleic Anhydride in commercial quantities. This material is in a newly engineered physical form—hollow cylinders that are easy to handle, resist "dusting", and melt or dissolve quickly because they have maximum surface area.

"Soft" drying oils such as soya are modified with Maleic Anhydride to give improved drying rate and decreased bodying time. Ester gums modified with Maleic Anhydride are higher melting and have better color and bodying characteristics.

Ethylene glycol and diethylene glycol maleates are copolymerized with styrene to make excellent laminating and molding resins. Maleic Anhydride—vinyl resin copolymers in vinyl resin coatings give outstanding metal adhesion upon air drying, avoiding the necessity for baked finishes in many applications.

Commercial quantities of Diethyl Maleate and Dibutyl Maleate are also supplied by CARBIDE. Research quantities of other Maleic Esters can be supplied upon request.

Call or write our nearest office for samples and up-to-date technical data on CARBIDE's Maleic Anhydride and Maleic Esters.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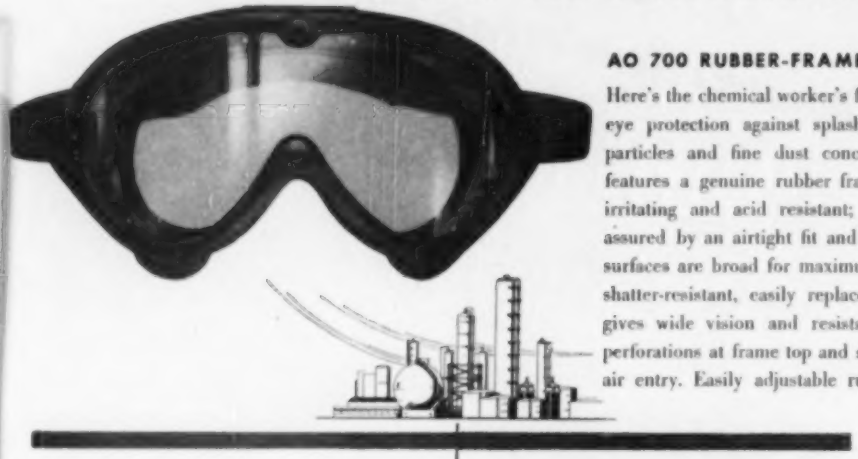
AO Rubber Frame Goggles

Favorites because they're

LIGHT and COMFORTABLE



AO 700 RUBBER-FRAME GOGGLE

Here's the chemical worker's favorite for "4-in-1" eye protection against splashes, spray, foreign particles and fine dust concentrations. Goggle features a genuine rubber frame which is non-irritating and acid resistant; positive safety is assured by an airtight fit and all face-contacting surfaces are broad for maximum comfort. Large, shatter-resistant, easily replaceable acetate lens gives wide vision and resists fogging because perforations at frame top and sides permit ample air entry. Easily adjustable rubber headband.

AO 705 SUPER-VENT GOGGLE

WHERE IT'S HOT AND HUMID the super-vent nose piece of this goggle is a friend indeed! Its inhalation and exhalation valves prevent fogging and steaming.* Acid or dust can't seep through the airtight frame molded from acid-resistant, non-irritating rubber. Further ventilation and anti-fogging are provided by perforations at top and sides. Ventilation is indirect, dust cannot reach eyes. Headband and lens are similar to those of the "700" goggle.

*On inhaling, air removes moisture on inner lens surface before it can fog. Exhaling, inlet valve closes, allowing moist air to escape through exhalation valve.

Your nearest AO Safety Products Representative can supply you

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SAFETY PRODUCTS DIVISION

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AUTOMATIC CONTROL EQUIPMENT

ENGINEERED DESIGN BY HAMMEL-DAHL

Spline Type Plugs mean flow control to the Last Drop!

"Fifteen" SPLINE TYPE SEAT GUIDED PLUGS are INTERCHANGEABLE in ½, ¾ and 1" Microflo Barstock Bodies. Trim is solid Stellite. The retained seat is type No. 12 and the plug is type No. 6 Stellite. The spline plug has a valve lift of 1", from the closed to the wide open position. Rangeability 50:1, or better, in all fifteen plugs. Equal percentage flow characteristics sizes No. 1 thru No. 5. Linear flow sizes No. 6 thru No. 15. Spline plug is a selective fit in a honed seat.

* The valve flow coefficient "Cv max." at one inch of lift, is equal to the rate of flow in GPM of water (or equivalent "cc") at one psi pressure drop across the valve body. The minimum flow will be 1/50 of Cv max., shown in the table.

* CONVERSION OF FLOW COEFFICIENT Cv TO CUBIC CENTIMETERS

Valve Size	Cv	CC
1	0.65	2250
2	0.60	1814
3	0.26	944
4	0.16	603
5	0.10	378
6	0.065	236.8
7	0.040	151.2
8	0.025	94.5
9	0.016	60.5
10	0.010	37.8
11	0.0065	23.68
12	0.0040	15.14
13	0.0025	9.46
14	0.0016	6.05
15	0.0010	3.78

HAMMEL-DAHL COMPANY

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ALBANY BOSTON BUFFALO CHICAGO CINCINNATI CLEVELAND DETROIT
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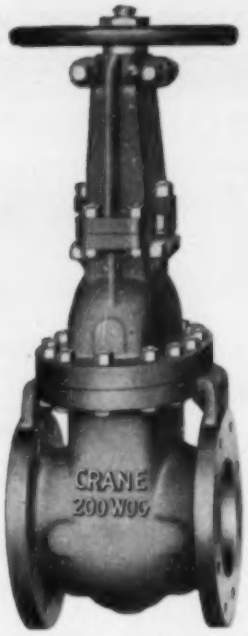
In Canada: Ro-Way & Flow Engineering Corporation, Ltd.

FOR VALVES THAT CHECK CORROSION LOOK TO THE CRANE LINE

ALLOY CAST IRON GATES FOR PROCESS INDUSTRIES



No. 14447 Gate 18-8 Mo Trimmed. Working Pressure: 200 pounds cold water, oil, gasoline or gas. Sizes: 2 to 12 inch.

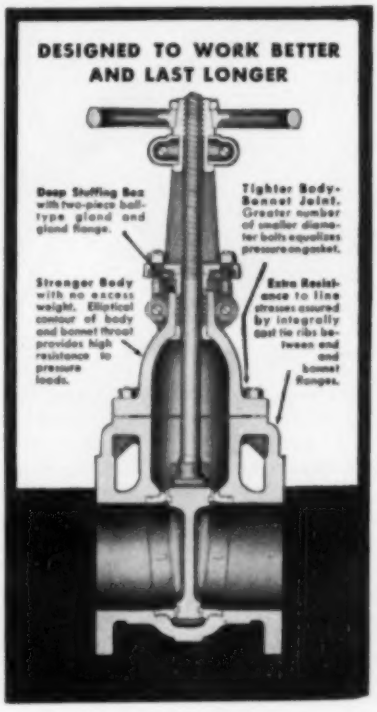
These Crane valves find wide application in services where conventional "all-iron" and "brass trimmed" valves fail because of corrosion of seating surfaces. Valve body and disc are Crane Low Nickel Alloy Iron, offering greater resistance to corrosion than ordinary gray iron. For a point by point analysis of these better corrosion-resistant Crane valves, see the features listed below.

Better Flow—straight-through ports are non-restricting to flow; minimize turbulence and corrosive action.

Tight Seating—18-8 Mo renewable screwed-in shoulder-type body seat rings do not loosen in service. Full length integral disc guides keep disc travel true; eliminate drag and undue wear on seating surfaces.

No Stem Binding—Two-piece ball-type gland maintains uniform pressure on packing; prevents binding on stem when gland bolts are not pulled up evenly.

No Side Strain On Stem—"T-head" disc-stem connection prevents any side strain on stem; gives flexibility for smooth operation.


DESIGNED TO WORK BETTER AND LAST LONGER
Deep Stuffing Box with two-piece ball-type gland and gland flange.
Tighter Body-Bonnet Joint. Greater number of smaller diameter bolts equalizes pressure on gasket.
Stronger Body with no excess weight. Elliptical contour of body and bonnet throat provides high resistance to pressure loads.
Extra Resistance to line stresses assured by integrally cast tie ribs between end and bonnet flanges.

Send for Circular No. 320

For further information about these—and other—corrosion-resistant valves, see your new No. 49 Crane Catalog, or send for Corrosion-Resistant Piping Materials Circular No. 320. No obligation.

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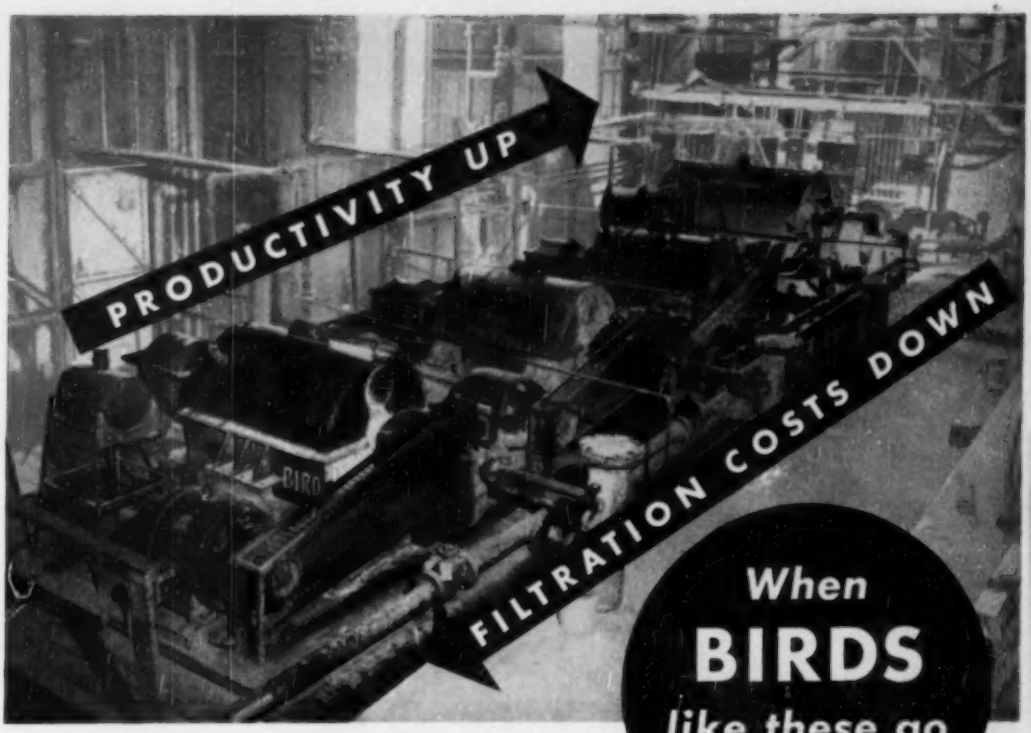


It's the same story in plant after plant. First, one BIRD Continuous Centrifugal Filter is tried. Then, a battery of BIRDS takes over the entire filtering job.

BIRDS do the job better — they produce a drier cake — handle either thick or thin feeds — temperature makes no difference — feed solids can vary widely in particle size

and easier — operation is continuous and automatic — no cloths, no filter media, no vacuum, no auxiliaries

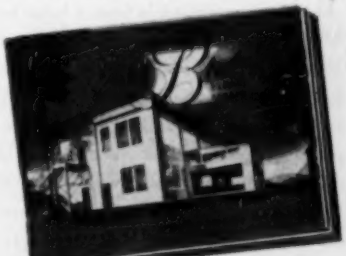
and faster — feed is accepted continuously and directly from the evaporator, crystallizer or reactor — material is retained in the Filter for less than a minute — there is no temperature change

and cleaner — as the picture shows, the filtering operation is completely under cover

and cheaper — the filtering process is simplicity itself — no operating labor — minimum supervision — minimum floor space — low cost of installation, operation and maintenance

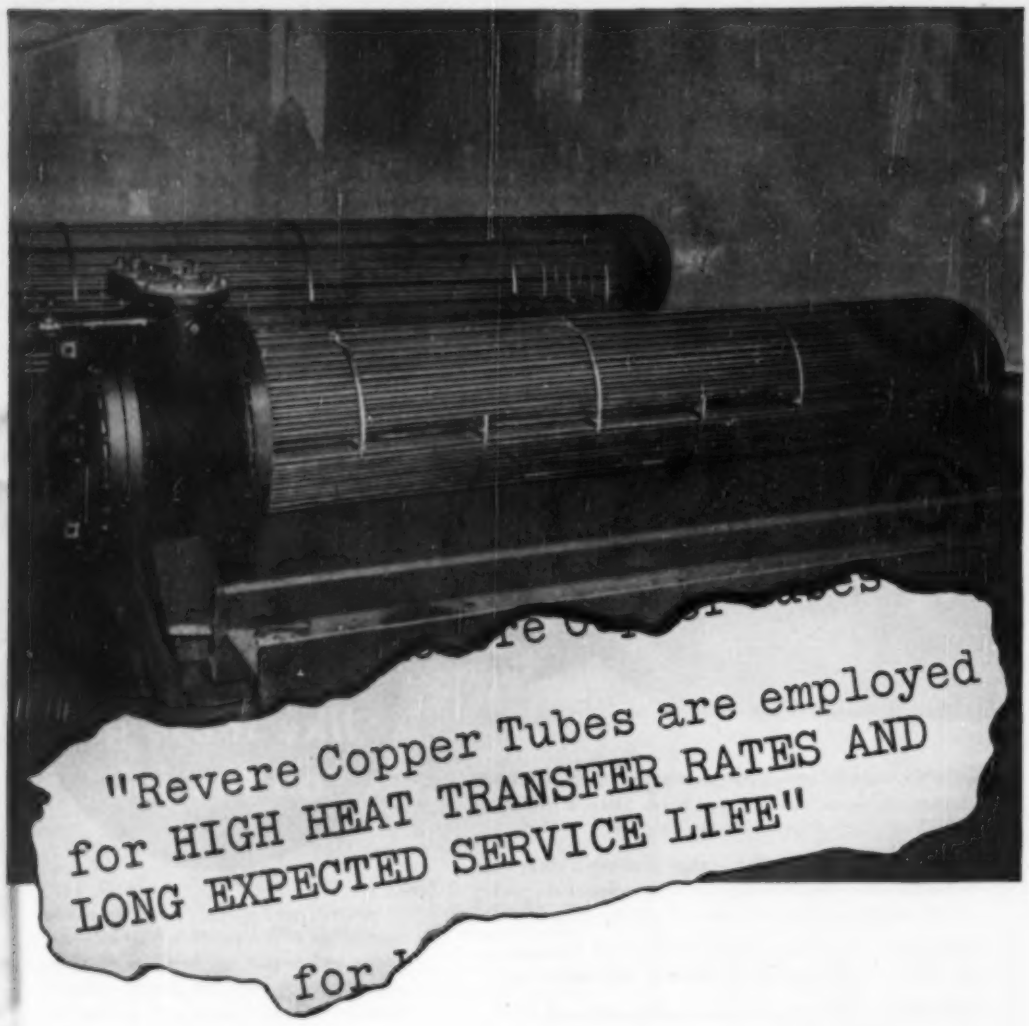
Want to find out what this BIRD can do for you?

SEND FOR THIS BOOKLET. **It's the picture story of the Bird Research and Development Center and how it can help you to tell in advance exactly what this modern filtration method can do to improve your product, increase output and reduce cost.**



BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS



The above quotation is from a letter by the Struthers Wells Corporation, Warren, Pa., accompanying the picture shown above. The picture shows two boiler feedwater heaters, intermediate and low-pressure, made by Struthers Wells for the generating station of a large public utility. These two tube bundles contain Revere deoxidized copper tubes, made to ASTM Specification B-111. One uses ¾" O.D. x #18BWG tube, while the other has tube ⅝" O.D. x #18 BWG. It will be noted that some of these tubes are bent to a small radius; superior bending quality is one of the features of Revere Copper Tube supplied for such purposes . . . In addition to copper tube, Revere offers for condenser and heat-exchanger service tubes in all the customary copper alloys, such as Admiralty Metal, Muntz Metal, the brasses and bronzes, and the cupro-nickels . . . For true economy it is important to select the correct size and alloy to meet actual conditions of use. Revere will gladly collaborate with you in such selection, whether for new equipment, or for re-tubing.

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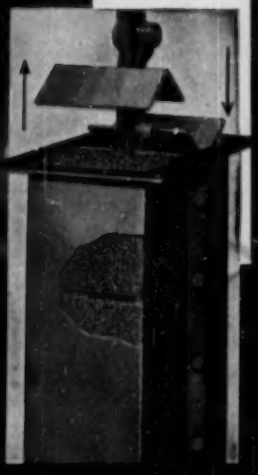
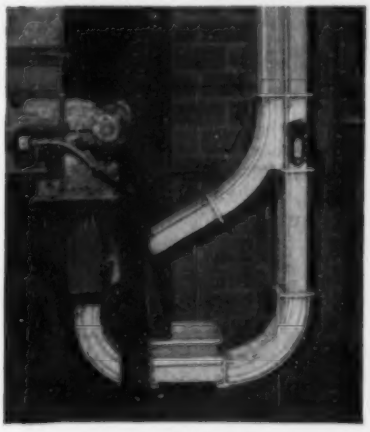
Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.
Sales Offices in Principal Cities, Distributors Everywhere.

Cut-away view shows chain and flights.



LINK-BELT Bulk-Flo *Streamlines* Your Bulk Materials Handling

Illustrations above and below show typical vertical and horizontal runs of Bulk-Flo in flour mill.



Many types of bulk materials are handled at substantial savings in overall cost, with the simple, compact, Link-Belt Bulk-Flo conveyor-elevator-feeder. Moving steadily along in a compact mass, churning or degradation of the material being handled is minimized, and power consumption is held at a minimum.

The dust-tight casing is compact, occupies minimum space and is largely self-supporting, so that layouts are simplified. Multiple feed and discharge points can be located on horizontal runs.

Book No. 2175 tells the whole story, fully illustrated. Send for a copy and learn the advantages of Bulk-Flo in handling bulk materials in your operation.

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Belt Conveyors
Screw Conveyors
Bulk-Flo Conveyors
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"THE COMPLETE LINE"

STANDARD HERSEY

Now welded together...

The experience of the East and the developments of the West united!

STANDARD Steel Corporation of Los Angeles announces with pride the acquisition of the Dryer Division of Hersey Manufacturing Company of Boston—the oldest dryer manufacturer in America.

The joining of these two organizations creates a fund of DRYER KNOWLEDGE unequalled anywhere. To STANDARD's already fine dryer organization are added the engineering data and key personnel of HERSEY. The results:

- ABILITY to supply dryers for every industry.
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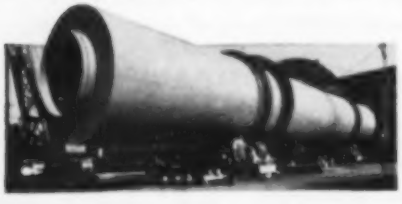
- FACILITIES to test materials—to try new designs—to manufacture all types of dryers EFFICIENTLY.
- TALENT to investigate, to advise, to ANSWER your dryer problems.
- SERVICE representatives throughout the world.

Steam jacketed horizontal dryer. Available in pressure, atmospheric or vacuum types.



Direct heat rotary dryer. One of 32 types used in chemical and food processing industries.

Write TODAY *for the new* STANDARD-HERSEY *bulletin,* describing our Continuous and Batch DRYERS, Rotary COOLERS, KILNS, and CALCINERS for the Process Industries.

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for Safety, Surety and Savings

...OPERATE DISTANT VALVES by LIMITORQUE REMOTE CONTROL

The important safety factor afforded by *LimiTorque Remote Control* cannot be overstressed, because men do *not* have to go to high, low, dangerous or inaccessible locations to open and close valves. Further, *LimiTorque* prevents damage to seats, discs, stems, etc., because it *"automatically" shuts-off the power,* should an obstruction in closing occur.

Think of the savings effected in time and money by eliminating men going from one valve to another (many of which are at distant locations)—not to mention the time required to shut or open each valve. *LimiTorque Remote Control* not only prevents this waste, but enables one man to merely *"push buttons"* and actually see on a panelboard whether the valves are open or closed.

Various *LimiTorques* are available for different requirements on all types of valves (globe, gate, butterfly, plug, etc.)—and, too, *LimiTorques* may be supplied for actuation by any power source, such as electricity, steam, water, gas, oil or air.

Thousands of *LimiTorques* are in use throughout the world, on land and sea. Be convinced; send for our 96-page catalog, L-48, and please use your Business Letterhead when requesting it.

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D-40's superior *cleaning action* really gets the dirt, yet D-40 is neutral and will not harm the finest fabrics.

D-40's fast *wetting and penetrating* action and its remarkable stability over a wide range of pH conditions have proven helpful in a variety of industrial applications from fruit washing to dye leveling.

D-40's abundant *foam* will add "life" to any compound, yet for special purposes, the foam can easily be eliminated.

D-40 in new whiter color, designed to suit any industrial, compounding or repackaging requirement, is now available in three particle sizes: flakes—granules—powder.

Oronite's Detergent Raw Materials are available in forms to fit the requirements and resources of all possible users. (1) *Alkane*, a clear, water-white alkyl aromatic hydrocarbon. Available to primary manufacturers of quality detergent products as a base stock for sulfonation. (2) *Detergent Slurry*, the sulfonated derivative of Alkane. A paste-like product for use in many cleaning applications or as a base for further compounding and drying. (3) *Dry Detergents D-40 and D-60*, the dry products from Oronite Detergent Slurry.

Ask for complete technical information from your nearest Oronite office.

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ALOYCO introduces better sampling valves in stainless steel and corrosion-resistant alloys

The use of valves for sampling liquids to secure accurate analytical data is an important phase in the control of many chemical processes. To eliminate the many disadvantages of standard valves for this service, Aloyco has developed valves designed specifically for sampling purposes. These valves are available in Aloyco 20, 18-8S, 18-8SMo and other alloys.

Send for Bulletin No. 4

Figure No. 733 incorporates all the features found most desirable for sampling operations. It has a surge chamber which eliminates splattering and the inlet flange may be tapped to receive a pipe extension for sampling in zones away from the vessel's side walls. When installed the stem is vertical as a safety and space saving factor.

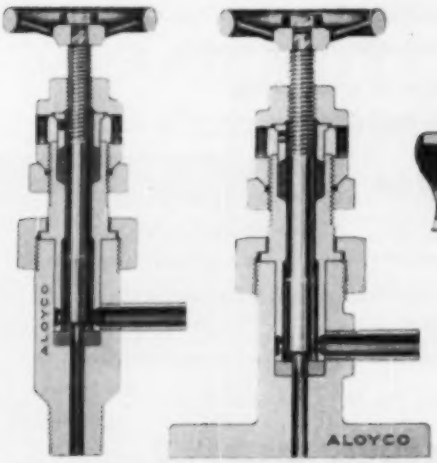
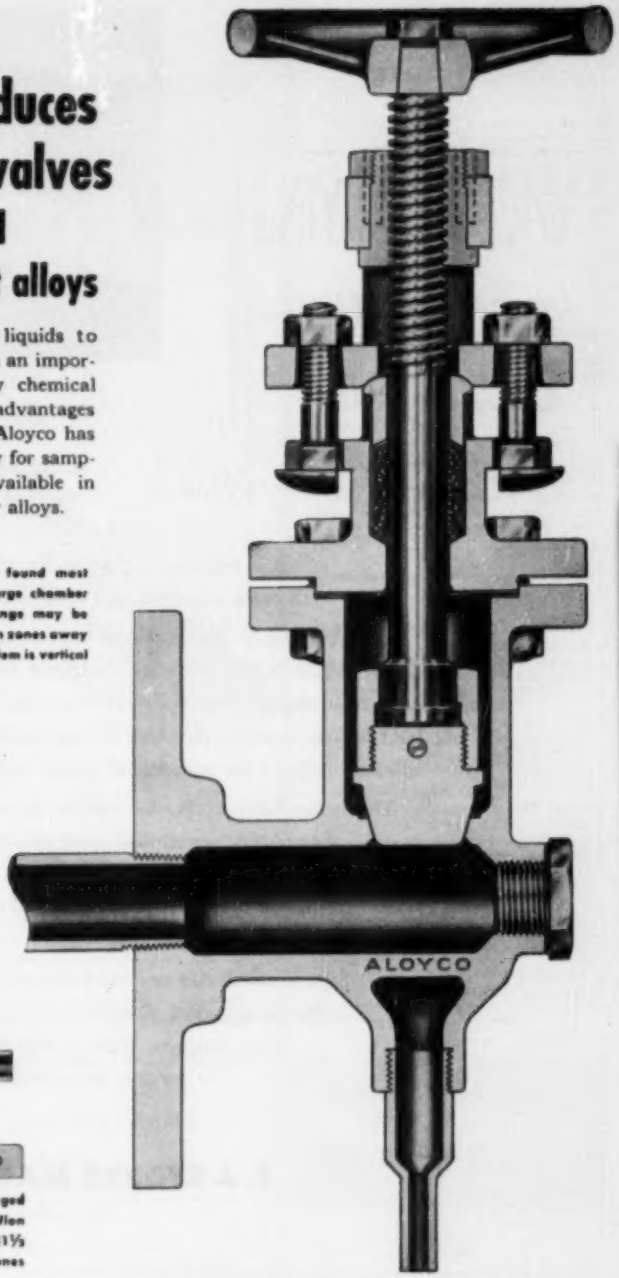


Figure No. 732½ screwed end and Figure No. 731½ flanged end are union bonnet, outside screw valves, with Teflon renewable seats. Stems are in horizontal position. No. 731½ may be provided with a tapped inlet for sampling in zones away from vessel's sidewalls.



Aloyco Valves are manufactured in compliance with the new MSS Stainless Steel Valve Standards S.P.-42.

ALLOY STEEL PRODUCTS CO., Inc.

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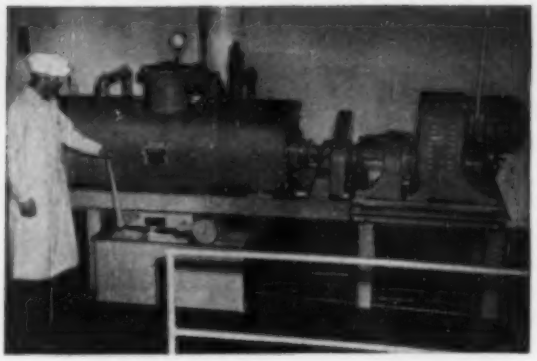
VACCUM DRYING *improves processes... develops new products... cuts costs!*

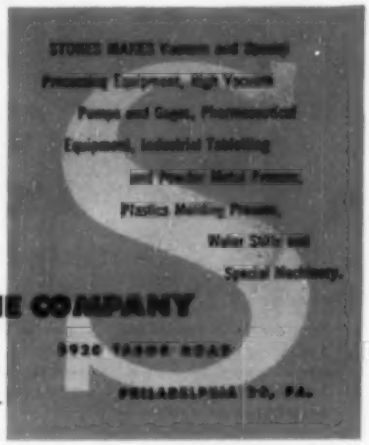


At John Morrell & Co., Ottumwa, Iowa plant, a Stokes Rotary Vacuum Dryer has been installed for extensive test runs . . . to improve processes, cut costs, and develop new products.

Designed for drying at low temperatures materials that may be tumbled — crystals, heat-sensitive chemicals and foods, metallic powders, fish meal, shellac, milk, sugar — Stokes Rotary Vacuum Dryers are application-engineered and built for the vacuum processing of these products. They are also highly efficient units for the recovery of alcohol and other valuable solvents.

The Stokes Advisory Service assists plants in solving *drying problems*... controlled tests are made on semi-plant-scale equipment... complete operating procedures and cost estimates are provided.

It pays to ask Stokes to work with you in the development of methods to improve your products. Write... today... for detailed information.



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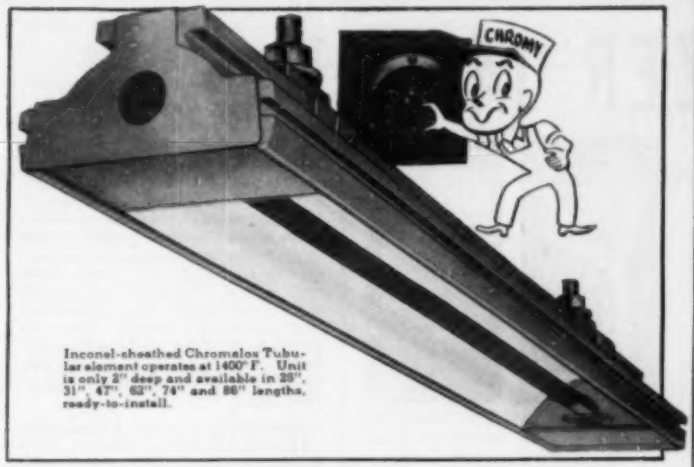

Inconel-sheathed Chromalox Tubular element operates at 1400° F. Unit is only 2" deep and available in 25", 31", 47", 62", 74" and 86" lengths, ready-to-install.

WITH **CHROMALOX** ALL-METAL *Electric*

Radiant Heaters

Uniform, exact heat when you want it is yours at the turn of a dial when you use CHROMALOX Electric Radiant Heaters as your heat source for infrared drying, preheating, baking, curing, dehydrating and similar applications.

Quickly and easily installed CHROMALOX Radiant Heaters give uniform heat without hot spots; operate efficiently in low and high ambient temperatures; provide glareless radiation in wave lengths absorbed more efficiently by all colors, textures and surfaces. All-metal construction enables units to withstand shock, vibration, dust, moisture; and eliminates hazards of contamination.

Write today for details on how flexible and dependable CHROMALOX Radiant Heaters can save time, materials and money in your plant.

DIALED INFRARED HEAT WILL GIVE YOU ALL THESE ADVANTAGES . . .

EXACT HEAT CONTROL
Finger-tip control at the turn of the input controller knob assures consistent, exact operating temperatures every time!

QUICK CHANGE-OVERS
Within a few minutes after the input controller is reset, you have a new heat to meet changed temperature requirements.

PRECISE DUPLICATION
It's easy to duplicate required working temperatures day-in and day-out without guesswork by setting the input controller dial to the logged temperature point.

MULTI-PURPOSE or ZONED OVENS
Various zones of heat are possible within the same oven by setting up separate controls for each bank of units. Then each bank can be individually controlled by its own dial.

CHROMALOX } *Electric Heat for Modern Industry*

FACTS ABOUT APPLICATIONS USING CHROMALOX RADIANT HEATERS

Many plants, faced with increasing production costs, have substantially cut working time and costs by using Chromalox Electric Radiant Heaters. If you use heat in your plant for processing, perhaps, you too can benefit by changing to Chromalox Electric Radiant Heat. Look over the typical applications below . . . then send for the full story about this modern heat source.

Application Report 101:
LESS FLOOR SPACE—SAFER OPERATING CONDITIONS are features of a Radiant Heater installation that also provides faster, continuous production for forming soft balls in heated metal molds.

Application Report 102:
SPEEDIER DRYING, NO HOT SPOTS with Chromalox Radiant Heaters result in complete and uniform drying of plastic powders in 10-15 minutes, compared with half-hour with previous heating method.

Application Report 104:
NO DISCOMFORT FOR OPERATOR of punch press while punching holes in plastic strip material. Radiant Heater is used to maintain proper temperature in strips between preheating oven and press.

Application Report 105:
OPERATING IN HIGH AMBIENT TEMPERATURES, Chromalox Radiant Heaters provide a more efficient method for more uniformly knitting asphalt to battery cases. Variable control adjusts heat to battery heights.

Application Report 109:
NO GLARE TO ANNOY PERSONNEL is one feature of Chromalox Radiant Heaters used to dry a cement seal in base of television tubes. Heaters operate on an open conveyor.

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Yes . . . send me full details on Chromalox Radiant Heaters.

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IC-44

For Your Information

Every month Monsanto publishes these pages of pertinent information, selected to help you improve your products, lower your production costs, increase your sales . . . Reprints will be sent regularly to you, or other members of your organization, on request.

SANTICIZER 141

. . . only plasticizer giving vinyls flame resistance . . . plus nine other important qualities

WITH ORDINARY PLASTICIZERS plastic films burn readily.

WITH SANTICIZER 141 films will not support flame.

Monsanto's Santicizer* 141, member of the world's most versatile family of plasticizers, delivers *more* desirable qualities to high-grade vinyls *than any other plasticizer*. With these qualities, you can gain *more* customer acceptance for your product . . . *more* repeat sales . . . *more* profit.

Compare the properties of Santicizer 141 with those of any other plasticizer. See how much *more* you get with Santicizer 141. The advantages delivered by Santicizer 141 include the following:

1. Flame resistance. 2. Low toxicity. 3. Softness and drape. 4. Resistance to weather. 5. Low-temperature flexibility. 6. Light stability. 7. Low volatility. 8. Resistance to embrittlement. 9. Strength, elasticity, abrasion resistance. 10. Improved processing.

If these qualities are important to your product, it will pay you to get full details on Santicizer 141. Use the coupon to get your free copy of the sixteen-page booklet: "Santicizer 141 . . . the *Safe* Plasticizer."

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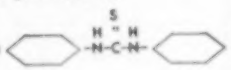
Research Chemists' Corner

You may find something new here

Chemists who are looking for ways to improve their products or develop new ones may profit from studying the specifications of Monsanto's thiocarbanilide (diphenyl thiourea) given here. Research in the application of this product is far from exhausted. It may hold the secret of great forward steps for your business. If you'd like to test thiocarbanilide for its possibilities in your projects, we'll be pleased to send you a sample without cost and without obligating you in any way. Just indicate your wishes on the coupon!

THIOCARBANILIDE
(Diphenyl Thiourea)

Structure:



Moisture:	0.5% maximum (test must avoid decomposing conditions)
Ash:	0.5% maximum
Specific Gravity:	1.32 @ 25° C.
Solubility:	Soluble in alcohol. Insoluble in water and many other common solvents.

Two grades are available, one a white powder melting at 148° C. minimum and the other a white-to-grey powder melting at 146° C. minimum.

Reactions: A weak organic base. Boiling with hydrochloric acid results in formation of phenyl isothiocyanate. The sulfur can be removed by PbO in alcohol solution forming carbodiphenylimide or, in the presence of ammonia, diphenylguanidine. Condensation with CS_2 and sulfur under pressure produces 2-mercaptobenzothiazole.

Take your choice of three forms of Monsanto Phenol

Whether you use phenol for any of various products, ranging from pharmaceuticals to photographic chemicals, you can get the form you want from Monsanto. Monsanto Phenol is available as: Phenol, U.S.P.; liquid phenol, 85% solution; and liquid phenol, 88% solution. Delivery of phenol, or any of the long list of Monsanto Intermediates, can be made promptly from the Monsanto Warehouse nearest your plant.

If you would like information or quotations on phenol or any of the Monsanto Intermediates, mail the coupon, or make your request to the nearest Monsanto Sales Office.

Monsanto Intermediates for prompt delivery

ortho-Aminobiphenyl
para-Aminobiphenyl
ortho-Anisidine
para-Anisidine
Benzoic Acid, Technical
Benzotrichloride
Benzyl Chloride
meta-Chloroaniline
ortho-Chloroaniline
para-Chloroaniline
ortho-Chlorophenol
para-Chlorophenol
Cyclohexylamine
Dicyclohexylamine
Dinitroaniline
Dinitrochlorobenzene, 46.5°
Dinitrochlorobenzene, 48.0°
Monsanto Salt
ortho-Nitroaniline
ortho-Nitrobiphenyl
para-Nitrobiphenyl
ortho-Nitrochlorobenzene
meta-Nitrochlorobenzene
para-Nitrochlorobenzene
para-Nitrophenol
ortho-Phenetidine
para-Phenetidine
Phenol, U.S.P.
Phenol, liquids, 85% & 88%
Phenolsulfonic Acid, 65% & 70%
Phosphorus Oxychloride — Phosphorus Trichloride
Salicylic Acid, Technical
Sodium Benzoate, Technical
para-Toluenesulfonamide
para-Toluenesulfonchloride
Toluenesulfonic Acid

* * * * * * * *

MONSANTO Sales Representatives are located in principal cities of the world. To get in touch with a sales representative, look under "Chemicals and Plastics" in the classified pages of your telephone book.

Santomerse No. 1 is hard-working detergent and wetting agent

In any process needing a reliable and hard-working detergent, wetter, emulsifier or penetrant, Santomerse* No. 1 proves itself to be efficient and economical. No other product in the classification of Santomerse No. 1 wets faster, penetrates deeper or cleans cleaner.

Santomerse No. 1 is the *all-purpose* detergent and wetting agent. It gives excellent results in hard or soft water . . . in acid or alkaline baths . . . in hot or cold solutions. Santomerse No. 1 rinses out quickly and thoroughly . . . does not form insoluble curds and can be used for removing such deposits formed by other materials.

For technical information on Santomerse No. 1 and its many applications, mail the coupon or contact the nearest Monsanto Sales Office.

* * * * * * * * *

Try Sterox DNK in de-inking newsprint

Many re-uses of newsprint require that *all* the printing ink be removed. And, to make re-use practical, the ink must be taken out rapidly, thoroughly and economically. Sterox* DNK meets *all three* of those requirements. Want to try it? Monsanto will provide technical counsel and Sterox DNK for a mill run . . . *free*.

* * * * * * * * *

MONSANTO manufactures more than 400 chemicals and plastics.

* * * * * * * * *

IF YOU WANT to make your own sulfuric acid, inquire about Monsanto-designed plants.

* * * * * * * * *

THERE ARE 27 MONSANTO plants, including those in Australia, Argentina, Canada, England and Wales.

* * * * * * * * *

MONSANTO CHEMICALS are used in producing more than 20,000 products.

MONSANTO SODIUM PHOSPHATES are produced in a modern chemical plant at Trenton, Michigan. Manufacturing processes are under strict production and laboratory control. This assures you of getting unexcelled quality and uniformity in sodium phosphates.

Build better detergents with Monsanto Sodium Tripolyphosphate

Among the numerous sodium phosphates in the Monsanto line is sodium tripolyphosphate, a product worthy of thorough investigation by cleaning compound manufacturers.

Sodium tripolyphosphate is high in detergency, sequestering and water-softening power. Soap scum and curds, characteristic of hard water when soap is used, disappear with the application of sodium tripolyphosphate.

Like other Monsanto Phosphates, sodium tripolyphosphate is in good supply as a result of expanded manufacturing facilities. It can be shipped from one of ten warehousing points that dot the map from coast to coast and from border to gulf. For further information and quotations on sodium tripolyphosphate or any Monsanto Phosphate, contact the nearest Monsanto Sales Office or mail the coupon.

Monsanto Sodium Phosphates and Some of Their Uses

MONO SODIUM—Water treatment, textiles, acid cleaning compounds.

DI SODIUM—Cheese, leather, textiles, detergents, dye, pigments.

TRI SODIUM — Water softeners, detergents, metal cleaners, textiles.

TETRA SODIUM PYRO — Soap, detergents, cheese, textile dyeing, bleaching and finishing, metal cleaning, oil-drilling mud, water treatment, water softeners, glass degreasing.

TRI POLY — Soap, detergents, water softeners, textile dyeing, bleaching and finishing, degreasing, metal cleaning, clay refining.

ACID SODIUM PYRO—Baking powder, oil-drilling mud, electroplating.

OTHER MONSANTO PHOSPHATES — Calcium phosphates, ammonium phosphates, potassium phosphates, ferro phosphorus, magnesium phosphates, aluminum phosphates, iron phosphates, alkyl acid phosphates, alkyl alkali phosphates, special phosphates and phosphoric acid.

* * * * * * * * *

MONSANTO CHEMICAL COMPANY, 1702-C South Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

*Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS for PLASTICS

SERVING INDUSTRY...WHICH SERVES MANKIND

Product:	Data	Prices
Santomerse No. 1	.....	.....
Sodium Tripoly Phosphate	.....	.....
Thiocarbanilide	.....	.....

Literature: .....Sanitizer 141

MONSANTO CHEMICAL COMPANY
1702-C South Second Street, St. Louis 4, Missouri

Please send, without cost or obligation, information and samples as indicated at the left.

Name.....Title.....

Company.....

Street.....

City.....Zone....State.....

Looking for a Stainless Steel Plate as "big as the side of a house?"

THIS 3/8" PLATE IS 220-1/2" LONG, 133-3/8" WIDE. U·S·S 18-8 CB. (TYPE 347)

Come to Stainless Headquarters **when your plate specifications call for sizes beyond the ordinary**

● We show you this huge plate of Stainless Steel, ⅜" thick, 220½" long and 133⅜" wide, not because we consider it unusual but because there are still some plate users who are not fully aware that Stainless Steel plate in these extreme dimensions is readily available.

The fact is we have been producing such extra-large sizes for some time and can supply even larger if you need them.

So whenever your designs call for large dimension Stainless Steel plates to improve your equipment or to reduce welding costs and simplify fabrication, tell us what you need and give us an opportunity to show you how well we can meet your requirements.

Keep in mind too, that U·S·S Stainless Steel plates are produced in the complete range of standard sizes usually required by industry, in thickness from ⅜₆" and greater, and are available in all U·S·S Stainless Steel grades.

In whatever size furnished, U·S·S Stainless Steel plates are distinguished for their superior surface quality. Chemical composition and physical properties are reliable. Our Stainless Steel specialists will be glad to cooperate with you in applying them to your construction to insure optimum results with minimum cost.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO · CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO · NATIONAL TUBE COMPANY, PITTSBURGH · TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

0-919

UNITED STATES STEEL

OIC
PACE SETTER IN VALVES

Engineered FOR LASTING SERVICE

200 LB. UNION BONNET BRONZE GATE VALVE

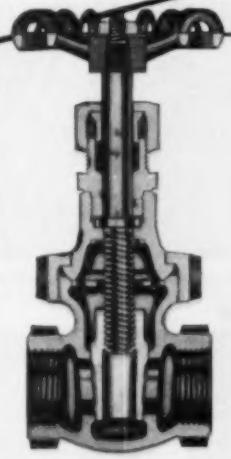


FIGURE NO. 7208 Non-rising stem, integral seat, OIC nickel alloy solid wedge, screwed end type.

FIGURE NO. 7200 Rising stem, integral seat, OIC nickel alloy solid wedge, screwed end type.

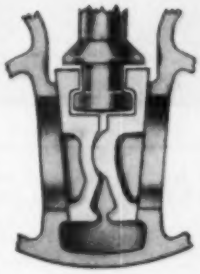


FIGURE NO. 7202 OIC Nickel Alloy double taper wedge automatically adjusts itself to its seat as valve is closed.

DESIGN: Solid wedge, rising stem; double-tapered wedge, rising stem; or solid wedge, non-rising stem. Integral seat, screwed end design.

BODIES: Of Steam Bronze ASTM B61, with average tensile strength of 40,000 lbs.

BONNETS: Also of Steam Bronze, with seal on lower end which mates with corresponding surface on stem to allow valve to be packed while fully open and under pressure. Condensing chamber below the stuffing box to keep packing cooler on high-temperature lines.

GATES: Of two types.

SOLID WEDGES are OIC copper nickel alloy, are of I-beam design, and reversible.

DOUBLE-TAPERED WEDGES fit into same bodies, but have ball and socket design, allowing wedge automatically to adjust itself to seat as valve closes. Accurately machined guides on both types, and tapered seating surfaces to give full contact with body seats as the wedges wear.

STEMS: Of manganese bronze, with double Acme thread for quick traverse of the wedge. Diameters sufficient to bear torsional loads greater than strongest hand pressure and to withstand severe operating conditions.

SEATING SURFACES: Machined to five-degree, self locking angle.

HANDWHEELS: Of ventilated malleable iron, finished in black enamel.

RATINGS: For steam at 200 lbs., 550 degrees F.; for cold water, oil, or non-shock gas service at 400 lbs. Shell tested at 500 lbs. and seat tested at 400 lbs.

SIZES: One-fourth inch to three inches currently available.

Special **INTRODUCTORY OFFER**

Check this 200-lb. Union Bonnet Bronze valve. Send us the size, and we'll deliver you a sample on memo billing. Keep it 30 days, take it apart, analyze it, test it. After you've examined all its superiorities, you may return it, if you wish, for full credit.

OIC VALVES

THE OHIO INJECTOR CO.
265 MAIN STREET WADSWORTH, OHIO

BRONZE • CAST STEEL • FORGED STEEL • IRON

What's so "New" about the New 1950 York V/W Ammonia Compressor?

IT CAN'T WEAR OUT!

FOR A FACT, you can't wear out a 1950 York V/W Ammonia Compressor! And the reason is simple: *Every part subject to wear is renewable!*

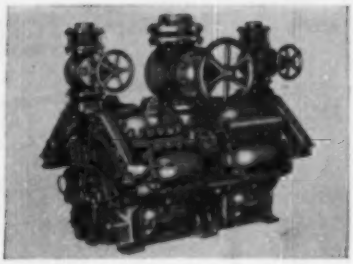
All you do is slip out the worn part, and slip in a new one. Not a "special" repair part oversized, for instance, to compensate for machining, but an identical component, resulting in new-machine efficiency, with all parts still standard in size —and all parts still renewable with standard replacements.

In addition, the parts of all York V/W Ammonia Compressors—for high-stage or booster operation—are interchangeable, cutting down stock-piling of spare parts.

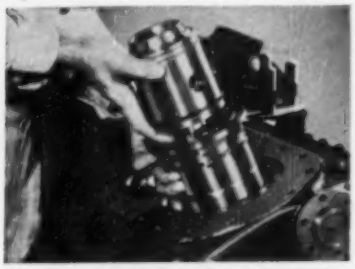
Simplicity of design, speed-and-ease of repair *pay off* in preventing production losses if shut-downs should occur. In less than four hours, even the large capacity 16-cylinder "V/W" can be completely rebuilt by one man.

For industrial or processing refrigeration, the new 1950 York V/W Ammonia Compressor—4, 6, 8, 12 and 16-cylinder —has built-in flexible capacities that make it universal in application . . . operates with any type of prime mover, including steam turbine, permitting use of low pressure or waste steam.

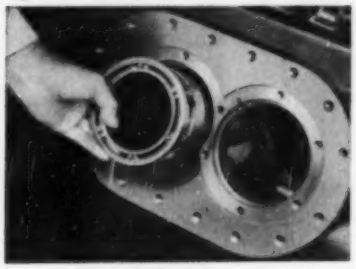
Let your nearest York Representative match his time with yours to discover *where* and *how* the 1950 York V/W Ammonia Compressor can save you money . . . improve your product. No obligation, of course. York Corporation, York, Penna.



Pistons are pulled with simple hand tools. No heavy chain blocks, or back-breaking, time-consuming labor.



The cylinder walls are hand-removable liners. Smooth, durable, high-polished, offer long, efficient service.



BE SURE YOU GET THESE YORK EXTRAS IN YOUR NEXT AMMONIA COMPRESSOR!

1. LOW INITIAL COST.
2. LOW OPERATING COST.
3. LOW MAINTENANCE COST.
4. SPACE-SAVING COMPACTNESS.
5. SIMPLIFIED MOTORS & STARTING CONTROLS.
6. VIBRATION-FREE OPERATION.
7. FILTERED LUBRICATION.
8. POSITIVE LUBRICATION.
9. POSITIVE SHAFT SEAL.
10. BOOSTER AND/OR HIGH-STAGE OPERATION.
11. COMPLETE NEW LINE.

York refrigeration and air conditioning

PIONEERS IN INVENTION AND DEVELOPMENT SINCE 1874

Refrigeration and Air Conditioning

OUR BUSINESS IS IMPROVING YOUR BUSINESS

A series of
Aromatic petroleum solvents

PiCCO HiSOLV

made in grades suitable for a variety of applications

FOR EXAMPLE:

DESCRIPTION	Low Boiling Aromatic Naphtha	Extra Light Solvent Naphtha	Medium Solvency Lacquer Solvent	Toluene Substitute	Xylol Type Aromatic Naphtha	Hi-Flash Aromatic Petroleum Naphtha	Stoddard Spec. Type Aromatic Naphtha	Slow Evaporation Aromatic Solvent	Kerosene Range Aromatic Solvent Oil
IDENTIFICATIONS	LBAN	ELSN	8	T	30	534	Spirits	40	473
APPLICATIONS *Paint, Varnish, Lacquer*		■	■	■	■	■	■	■	■
Wire Coatings					■				■
Insecticides; Pesticides					■				■
Wood Preservation									■
Degreasing					■	■			■
Printing Ink					■	■			
Brake Lining						■			■
Roofing						■			■
Synthetic Resins			■	■	■	■			

The above applications are representative of uses for which PICCO HISOLV solvents are currently being used. The versatility of these solvents leads to their use in many other ways.

Write for Samples

We will be glad to send you test samples of any of these solvents.

PENNSYLVANIA **INDUSTRIAL CHEMICAL CORP.**
CLAIRTON, PENNSYLVANIA

Plants at: Clairton, Pa.; West Elizabeth, Pa.; and Chester, Pa.

Distributed by: Pennsylvania Falk Chemical Co., Pittsburgh 30, Pa. and Harwick Standard Chemical Co., Akron 5, Ohio

LARGEST STAINLESS STEEL TANK
EVER to HIT the ROAD!

30 - TON GIANT CUSTOM - BUILT for PROCESSING INDUSTRY

CUSTOM-BUILT EQUIPMENT for the CHEMICAL and FOOD PROCESSING INDUSTRIES

- Acid Plants
- Chemical Plants
- Paper and Pulp Mills
- Rayon Plants
- Textile Plants
- Petroleum Refineries
- Bleach and Dye Houses
- Beverage Dispensers
- Breweries
- Dairy Plants
- Food Plants
- Meat Packing Plants

Across four states this special Kelley-built equipment traveled to its destination. Some trick? You bet. But not nearly as much as it was to fabricate this stainless steel behemoth 15 feet in diameter and 50 feet long. Complete with flanged and dished head, the tank is made of 3/8" stainless steel, type #316. It's a lot of tank and it took a lot of "know how" to build it.

O. G. Kelley & Co., fabricators and design engineers of Stainless Steel, Lead, Wood and Steel Equipment for the chemical and food processing industries, have long had the skill and facilities for the toughest, most specialized fabricating problems. Our engineers are at your disposal for consultation without obligation.

Expert Lead Burning Service at Your Plant or Ours. Specializing in complete lead installations for Acid, Chemical, Rayon, Paper and Textile Plants — Homogeneous Lead Bonded Equipment — Lead X-Ray Protection.

AFFILIATE COMPANIES

RESISTO PIPE & VALVE CO.
272 BRIDGE ST., CAMBRIDGE 41, MASS.

Craftsmanship and superior design have established Resisto products as top-notch equipment in the chemical and processing industries. Designed, machined and fabricated for specific purposes, Resisto equipment guarantees dependable, trouble-free service of maximum duration.

LEAD VALVES
Hard Lead, Lead Lined, Iron or Steel Body

CENTRIFUGAL PUMPS FOR ACID SERVICE

THE A. T. STEARNS LUMBER CO.
NEPONSET, BOSTON, MASS.

From experience comes success. Thus A. T. Stearns Co. boasting more than a century of reputation for quality construction in wood equipment, promises satisfaction from anything made of wood in their expert way.

ENGINEERS and ERECTORS of WOOD TANKS and GREENHOUSES

Specializing particularly in CYPRESS and REDWOOD "The Woods Eternal"

KELLEY
STAINLESS STEEL
LEAD
WOOD · STEEL
Fabrication

O. G. KELLEY & CO.

94 TAYLOR STREET, BOSTON 22, MASS.

CLEVELAND, OHIO · NEW YORK, N.Y. · PITTSBURGH, PA.
JOHNSON CITY, TENN. · ELIZABETH, N.J.

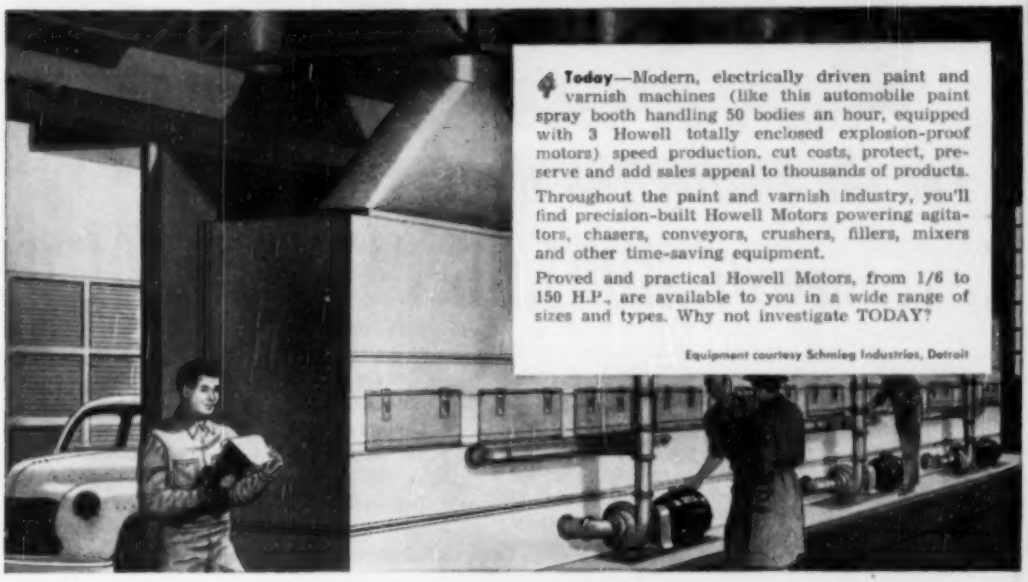
1 **1875**—For centuries, hard labor and a paintbrush were man's main means of adding beauty and color. But, with the industrial revolution at hand, new devices were sorely needed to break this bottleneck.

2 **1900**—The artist's airbrush was born. On its heels came the paint spray gun. Both products, strangely enough, stemmed from the atomizer used by doctors to prevent colds. Painting swung into high gear.

3 **1915**—Portable paint-spraying equipment was introduced in this, the year Howell "Red Band" Electric Motors arrived. Soon these rugged motors made important contributions to this and other industries.

PAINT . . . protects, preserves, decorates and sells!

(AND HOWELL MOTORS HELP SPEED MODERN PAINTING PROCESSES—CUT COSTS)



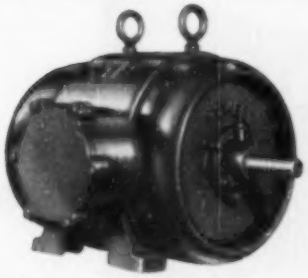
4 **Today**—Modern, electrically driven paint and varnish machines (like this automobile paint spray booth handling 50 bodies an hour, equipped with 3 Howell totally enclosed explosion-proof motors) speed production, cut costs, protect, preserve and add sales appeal to thousands of products.

Throughout the paint and varnish industry, you'll find precision-built Howell Motors powering agitators, chasers, conveyors, crushers, fillers, mixers and other time-saving equipment.

Proved and practical Howell Motors, from 1/6 to 150 H.P., are available to you in a wide range of sizes and types. Why not investigate TODAY?

Equipment courtesy Schmieg Industries, Detroit

Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.

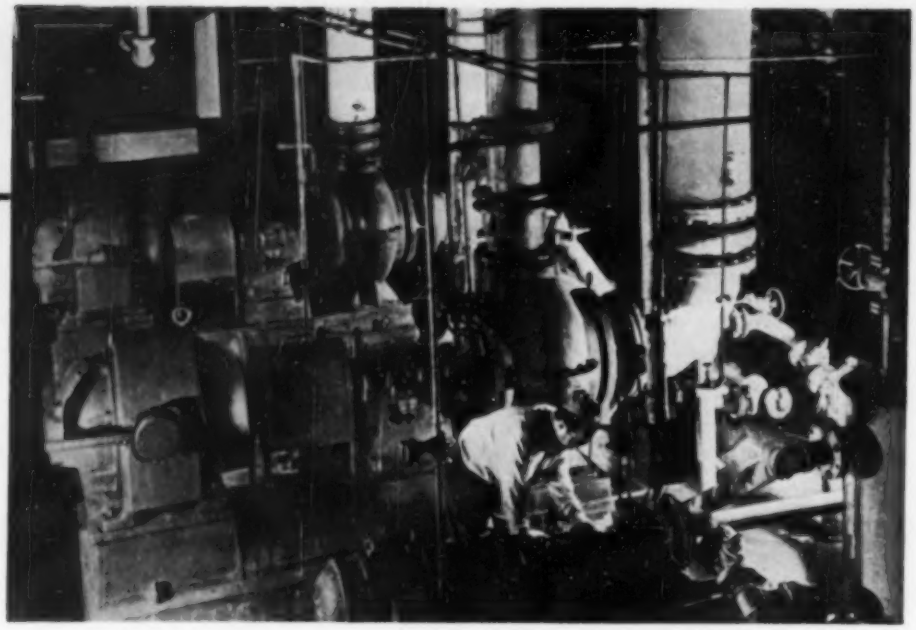


Howell totally-enclosed, explosion-proof motors for use where inflammable liquids or gases are handled or stored.

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Precision-built Industrial Motors Since 1915



For the Quality you want

...specify HOOKER CAUSTIC SODA

If you find it necessary to clean your caustic storage tanks frequently because of sludge deposits, it's time to try Hooker Caustic Soda. Thanks to a recently improved purification process, Hooker Caustic Soda is remarkably free from those impurities that leave sludge deposits. Low in iron and sulfates, it is a high purity product—a purity that is uniform in shipment after shipment.

You can be sure, too, that Caustic Soda from Hooker will reach you with the same high purity that it leaves our plant. Tank cars are all equipped with special protective linings. To make unloading and handling easier in cold weather, each tank car in the Hooker fleet is completely insulated and equipped with steam coils.

Hooker's Technical Staff is also at your service to give you help in the use and handling of Caustic Soda.

Hooker Caustic Soda is available in solid, flake, or liquid form. Liquid is supplied in 50%, 73% and special grade solutions.

For analyses and specifications on Hooker Caustic Soda, write on your business letterhead for technical data sheet No. 735.

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

HOOKER CHEMICALS

FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.

10-5

SODIUM SULFIDE • SODIUM SULFHYDRATE • SODIUM BENZOATE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE

TIMKEN CARBON STEEL TUBES Generally for service not exceeding 900°F., where corrosion and oxidation resistance are not important.

TIMKEN SICROMO 2 STEEL TUBES For service up to 1200°F., where better scale resistance is required than can be obtained with 2¼% Cr. ½% Mo. Steel.

TIMKEN SICROMO 5 S STEEL TUBES For oxidation resistance to 1500°F. Good creep strength and corrosion resistance to 1300°F.

TIMKEN CARBON-MO STEEL TUBES For temperature up to 1000°F. Improved creep strength makes it safer than carbon steel.

TIMKEN 2¼% CR-1.0% MO STEEL TUBES For service up to 1150°F. Has greater resistance to creep than 2¼% Cr. ½% Mo. Steel.

TIMKEN SICROMO 7 STEEL TUBES For applications requiring better corrosion resistance than can be obtained with 5% Chromium type steels.

TIMKEN DM STEEL TUBES For service up to 1150°F. This steel offers outstanding creep strength.

TIMKEN SICROMO 3 STEEL TUBES For service up to 1200°F. Have excellent oxidation resistance and good corrosion resistance.

TIMKEN SICROMO 9 M STEEL TUBES This steel possesses the maximum corrosion resistance of any of the steels below the stainless group.

TIMKEN 2¼% CR-½% MO STEEL TUBES For service up to 1150°F. Intermediate corrosion resistance plus good creep strength, fair oxidation resistance.

TIMKEN 4-6% CR MO STEEL TUBES For service up to 1200°F. Superior corrosion resistance. Less oxidation resistance than Sicromo 3.

TIMKEN 18-8 STEEL TUBES Shows the best combination of creep strength, oil corrosion resistance and oxidation resistance up to 1500°F.

Take one of these 12 steps to a better LIFE/COST ratio

IF you have a high temperature tube problem, chances are you can solve it—and get a better life/cost ratio, too—by switching to one of the twelve Timken® steels above.

These twelve steels are specially developed by The Timken Roller Bearing Company to cope with specific problems of heat, pressure, corrosion, and oxidation ...and to do it at lowest possible cost. Through analysis of your particular requirements, our Technical Staff can help you select the one steel that's best for your job. Their recommendations are backed by 19 years of experience and research in high temperature applications.

And whichever analysis is selected, you're sure of uniformly high quality because of Timken's outstanding quality control through every step in production.

Let our Technical Staff help you select your next high temperature tubes. There's no cost or obligation. For further information on high temperature tubing, write or wire The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

"You can engineer any trapping job with this book"

YOU CAN'T GO WRONG

Physical data and prices on all sizes and types of Armstrong steam traps.

How to calculate condensate loads and select traps for all classes of equipment.

Actual hot condensate capacity chart for every Armstrong trap, recommended safety factors and specific recommendations for many types of equipment.

THERE is no guess work about steam traps or steam trap selection when you have the 36-page Armstrong Steam Trap Book to work with. You don't waste money on traps that are too big for the job. You don't get inefficient drainage with traps that are too small.

This book explains the design, operation and advantages of Armstrong steam traps, specifies materials used, gives complete dimensional data, includes list prices, actual capacities under working conditions. There are 10 pages of tabular and technical data explaining how to calculate condensate loads and select the correct trap for the job, complete instructions on installation and maintenance. The Steam Trap Book also describes Armstrong traps for draining moisture from compressed air systems, Armstrong steam humidifiers for adding moisture to dry air and Armstrong non-condensable gas purgers for removing air from refrigeration systems.

Anyone is welcome to a copy of this useful guide to good trapping practice. Send for yours today.

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858 Maple St., Three Rivers, Mich.

ARMSTRONG STEAM TRAPS

NOW AND DURING THE RECENT PAST it has been our privilege to serve as Engineers-Constructors for a distinguished group of industrial leaders, among them:

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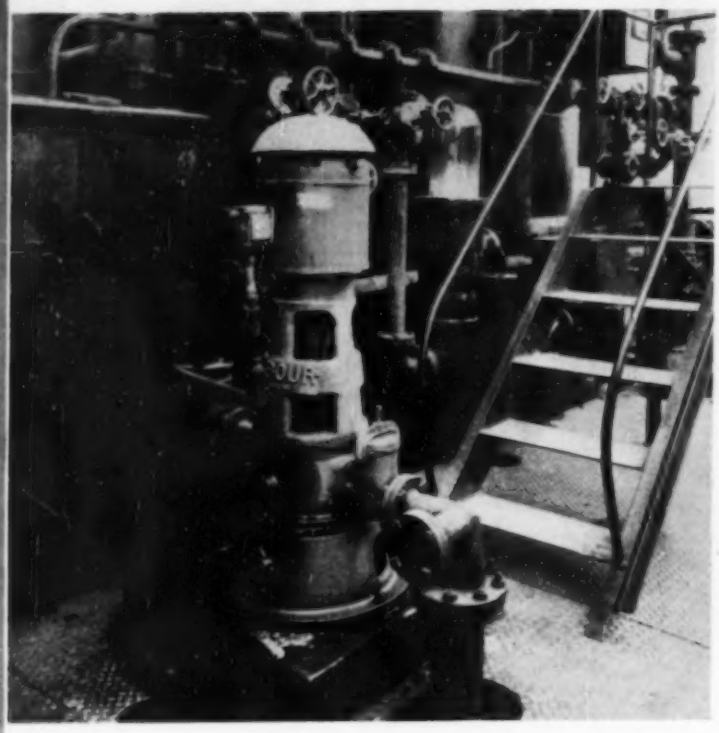
for DEPENDABILITY

they specified LABOUR



Here's a No. 10 LaBour Type G at work in a Chemco contact sulphuric acid system. The owners of this plant wanted dependability—freedom from costly process interruptions due to pump failures—and they got it when a LaBour was specified for the job.

LaBour Type G is the packingless, self-priming centrifugal pump that has revolutionized old concepts of pump maintenance. Since it has no packing gland, it never needs attention for tightening or repacking. There are no rubbing or wearing parts anywhere in this pump, and aside from occasional lubrication of the bearings there's nothing to do to keep it working properly. That's minimum maintenance at minimum trouble and expense.

If you aren't already familiar with the overall economy and process efficiency which a LaBour Type G can deliver, we urge you to write for full details. If you'll tell us the facts about the particular job you have in mind, we can give you specific information that may be of great value to you.

ORIGINAL MANUFACTURERS OF THE SELF-PRIMING CENTRIFUGAL PUMP

LABOUR

THE LABOUR COMPANY, INC. • Elkhart, Indiana, U.S.A.

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NEW CATALOG
with complete information

Grinnell welding fittings and forged steel flanges

Table of Contents

SEAMLESS CARBON STEEL BUTT WELDING FITTINGS

90° elbows . . . long radius, short radius, light gauge, special wall thicknesses

45° elbows . . . long radius, light gauge, special wall thicknesses

180° returns . . . long radius, extra long radius, short radius, light gauge, special wall thicknesses

tees . . . straight, reducing

stub ends

rings

dimensional tolerances

FORGED STEEL FLANGES

welding neck . . . 150 to 2500 lbs.

slip-on . . . 150 to 2500 lbs.

lap-joint . . . 150 to 2500 lbs.

threaded . . . 150 to 2500 lbs.

blind . . . 150 to 2500 lbs.

socket type . . . 150, 300, 600 lbs.

reducing . . . threaded and slip-on 150 to 2500 lbs.

orifice . . . slip-on, welding neck, welding neck, ring joint, threaded: 300 to 1500 lbs.

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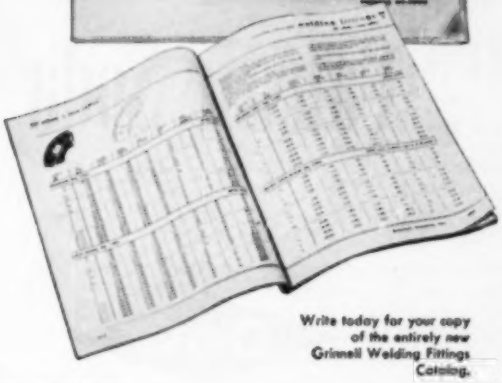
physical and chemical requirements



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F A M O U S

Caustic Comments

A famous author-humorist had finished an after-dinner speech. The next speaker, an attorney, rose, shoved his hands deep into his pockets, as was his habit, and laughingly remarked, "Doesn't it seem a little unusual that a professional humorist should have to try so hard to be funny?"

Drawled the humorist in a caustic manner, "And doesn't it seem a little unusual that a lawyer should have his hands in his *own* pockets?"

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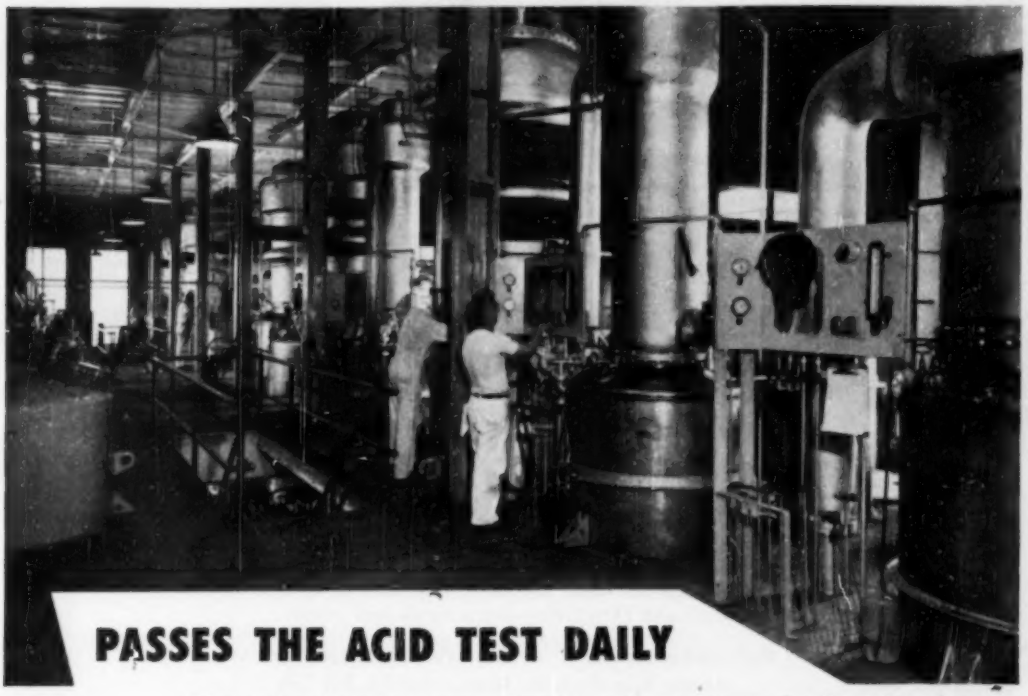
STAINLESS STEEL

THRIFTY METAL OF 10,000 USES

Evaporators of ENDURO Stainless Steel constitute a first line of defense against contamination — in the processing of pharmaceuticals or industrial chemicals. Wherever there is direct contact with the product in process—from digesters to nozzles —all-ENDURO equipment assures product purity and process efficiency.



PASSES THE ACID TEST DAILY

Most acids and alkalies in process--hot or cold – have little or no effect on process lines and equipment of ENDURO Stainless Steel. In addition, ENDURO is highly resistant to rust, corrosion and to extremes of temperature.

Its smooth, pore-free, sanitary-as-glass surface is easy to clean and keep clean – allows no foothold for contaminants. And being itself chemically inert, it sets up no metallic or chemical reactions with the product in process. It safeguards quality.

Little wonder that so much of today's chemical process equipment of all types is ENDURO. For, in addition to its protection of product purity, ENDURO holds maintenance to a minimum, equipment life maximum and productivity both high and constant.

In the long run, it pays to pay more for ENDURO. Ask your equipment supplier or your nearest Republic representative.

✓ **CHECK ALL 12 ADVANTAGES:** Rust- and Corrosion-Resistance • Heat-Resistance • High Melting Point • Low Coefficient of Expansion • High Strength • Good Dimensional Stability • No Metallic Contamination • Easy to Clean • Easy to Fabricate • Eye Appeal • Long Life • Low End Cost • *What more can be desired in a material?*

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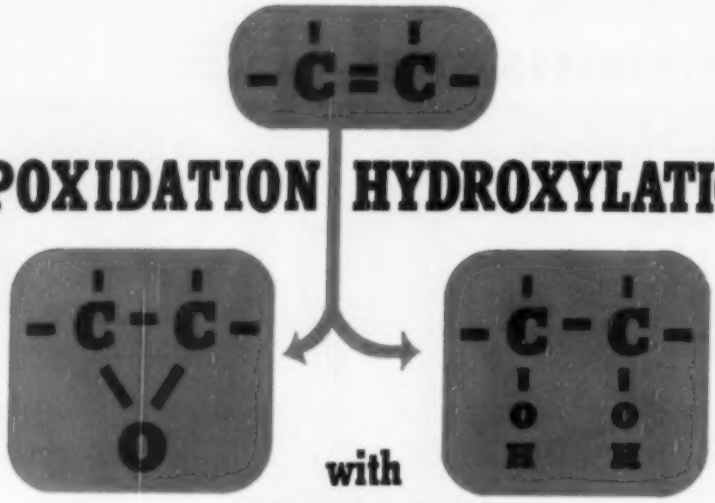

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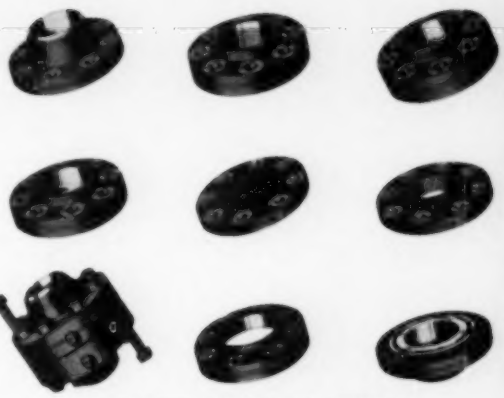
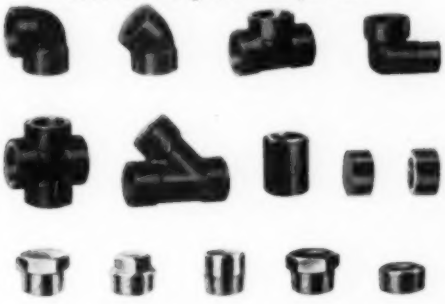
Standard through Double Extra Strong



FORGED STEEL FLANGES
½-inch through 30 inches
150 lbs. through 2500 lbs. pressure

TO MARK PROGRESS

FORGED STEEL FITTINGS
Screwed and Socket Welding
⅛-inch through 4 inches
2000 lbs. through 6000 lbs. pressure



LONG WELDING NECKS
1-inch through 24 inches

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26 inches through 96 inches

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Whatever the piping job... Ladish is prepared to supply your fittings needs. Here is the one line that offers them all... Seamless Welding Fittings, Forged Steel Flanges, Forged Steel Fittings, Large O. D. Flanges and Long Welding Necks... in an unrestricted selection of types, sizes, weights, pressure ratings and materials. Standardizing on this complete line not only simplifies procurement but also assures you of added dependability by protecting every joint of the system through use of Ladish Controlled Quality Fittings.

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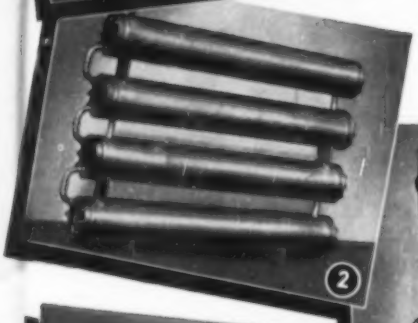
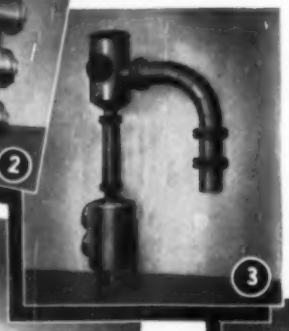
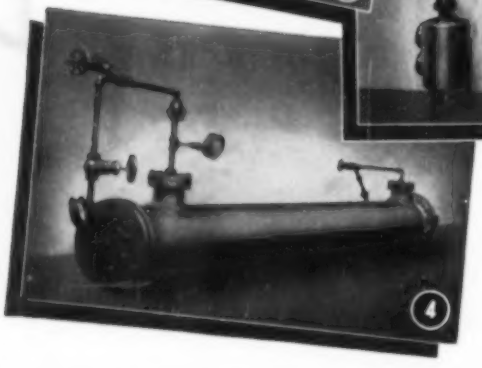
Fighting TOUGH *Corrosion*

and PRODUCT CONTAMINATION

with Special Materials...







1 **MONEL METAL** is used for all parts of the heat exchangers shown here ready for shipment. A mid-western chemical plant uses them to condense organic liquors.

2 **ALUMINUM** is employed one hundred percent in this M.E.A. Solution Exchanger built for the U. S. Government.

3 **STAINLESS STEEL, TYPE 304,** separator and receiver; part of a unit constructed for a leading paint manufacturer and used for the processing of lacquers.

4 **HIGH-CHROME IRON** (15-16% Cr.) was used for all parts of the exchanger unit shown under test in our shop.

5 **DEOXIDIZED COPPER** channel, separator and tubes with **PHOSPHOR BRONZE** tube sheets feature this special exchanger for a prominent chemical manufacturer.

New economies of trouble-free operation, increased production, and lower costs are realized from Vogt heat transfer equipment made from special materials to meet specific needs. They serve in leading Chemical and Process Industries everywhere.

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Vogt HEAT TRANSFER EQUIPMENT

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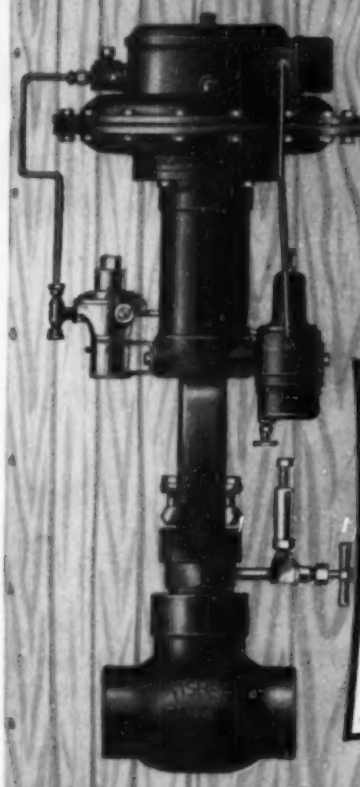
REGULATORS AND CONTROL VALVES



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Integrally mounted Wizard Pilot-operated pressure controller, requiring only one field connection.

"FACTORY PIPED"

DIAPHRAGM MOTOR VALVE WITH AIR-SET AND POSITIONER

Only 2 connections to make—from operating medium supply and controller.

Advantageous for installations in industrial process plants, gas pipe-line regulating stations and oil field applications. Saves time and expense ordinarily involved in handling usual piping accessories and piping details. Essential parts cannot be misplaced or incorrectly applied.

FISHER GOVERNOR CO.
MARSHALLTOWN, IOWA

in Mechanical Drive Turbines

TYPE DP

For flexible speed control, performance accuracy, and on-the-job reliability, you can't beat a General Electric standard DP turbine with its totally-enclosed hydraulic governing system.

This pressure-relayed system gives you ease and accuracy of control that compares with the precision speed governing of large central station turbines. Yet the DP is a standard design, sold at standard prices.

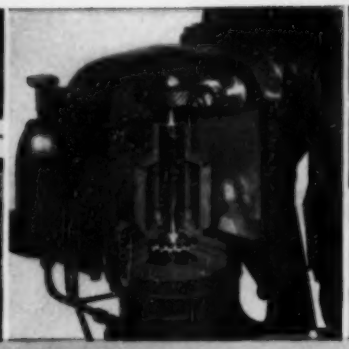
YOU GET A WIDE SPEED RANGE— 30% adjustment for flexibility of operation. This feature, combined with the wide variety of ratings and speeds available, provides you with the "right" turbine for any job.

YOU GET PERFORMANCE ACCURACY— 6% regulation means holding the speed you want on important processes. Regulator control is available for governing in terms of any process requirement.

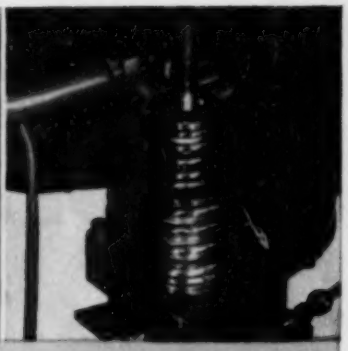
YOU GET GREATER RELIABILITY— the hydraulic governing system keeps moving parts to a minimum, operates in an oil atmosphere with no exposed linkages. This eliminates wear and corrosion, assures dependable operation.

Check the features of the standard DP. It can give you the kind of precision performance you're looking for, the savings in operating costs that boost profits. Contact your nearest G-E sales office for complete details. Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

In this plant, a General Electric 30-hp DP turbine is coupled to a centrifugal pump. The hydraulic governing system provides accurate, reliable performance over a wide range of speed adjustment.

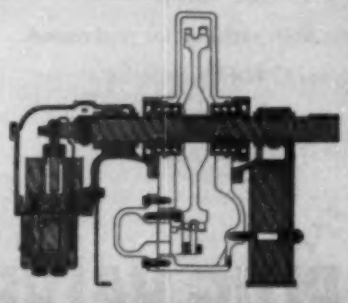


This turbine-type oil pump, gear driven from the main shaft, signals any tendency for the DP to speed up or slow down with changes in load. The pump also provides oil pressure for positioning the governor valve.



Acting on the speed signal from the oil pump, this pressure relay controls the amount of oil pressure in the operating cylinder. This cylinder regulates the amount of steam admitted to the turbine through the governing valve.

HYDRAULIC GOVERNING makes a difference



Here's What Standardization Provides For You

In the diagram at the left, all shaded parts are interchangeable on all sizes of DP turbines. Thus, it is easy to stock spares, and maintenance costs are reduced. All models have standard shaft height and coupling fits for easy installation or re-location in your plant. Standardization cuts manufacturing expense and the savings are passed on to you in the form of extra features usually found only on "special" turbines.

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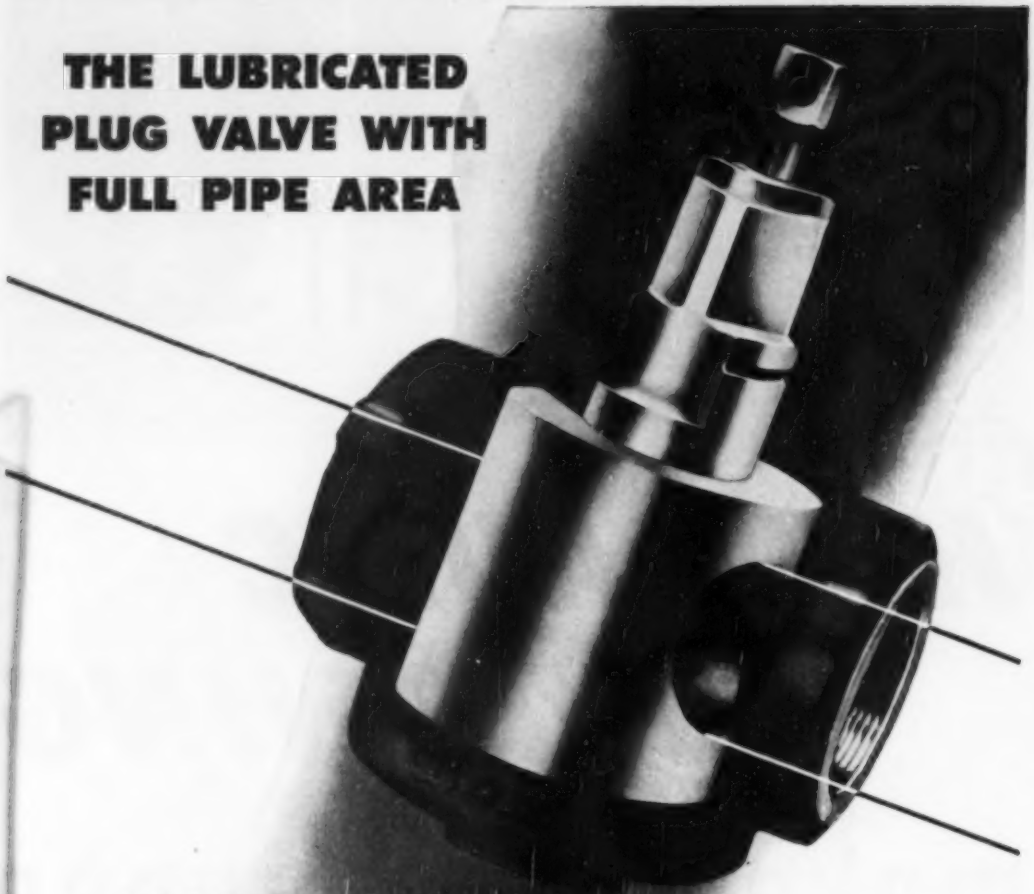
THE LUBRICATED PLUG VALVE WITH FULL PIPE AREA



a.c.f. CYLINDRICAL PLUG DESIGN

makes it possible. Straight-through openings result in smooth, non-turbulent flow, lowest head loss, reduced valve abrasion. Yet compact valve construction is retained in both rectangular and round-port types. Reason enough for a.c.f. Lubricated Plug Valve preference.

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Representatives in more than 50 principal cities

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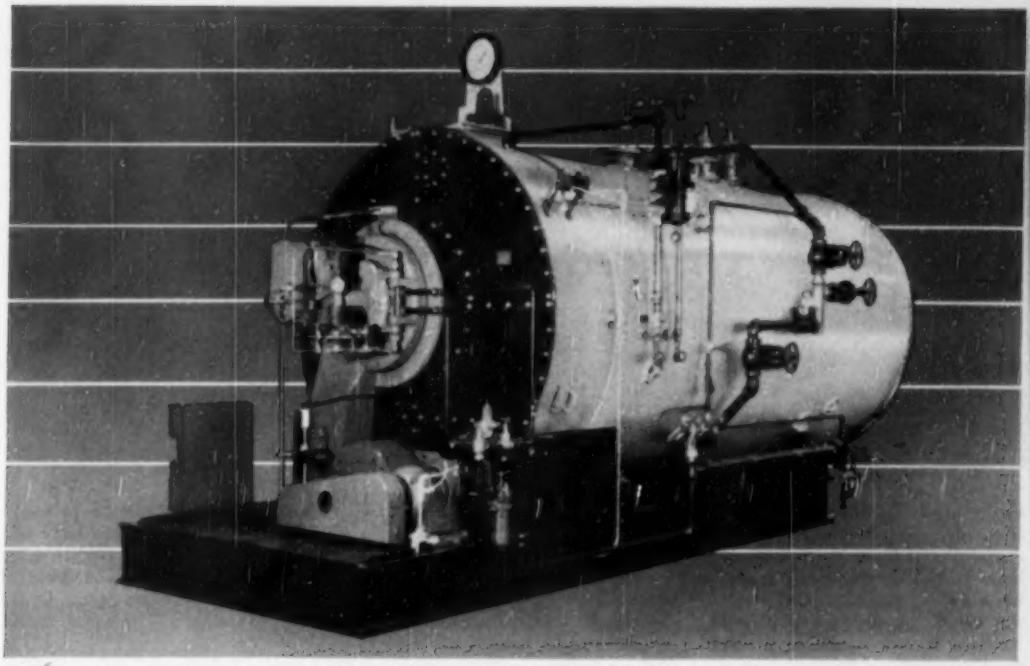
. . . Another Reason Why You Get A Greater Return From Your Investment In A Cleaver-Brooks Steam Boiler



Nothing is more important than dependable operation of your steam boiler — vital to such operation is proper maintenance and service.

Cleaver-Brooks steam boiler service facilities are national — through factory-trained and authorized service organizations. Service begins with starting of your new boiler. It is placed in operation and fully tested under load by Cleaver-Brooks service-representatives. Your operators are trained in operation, care and maintenance.

Burn the available fuel in your area — gas or oil — with equal efficiency: Through their high heat transfer Cleaver-Brooks boilers operate at a guaranteed efficiency of 80% from full load down to 30% of rating, burning gas, oil, or combination gas and oil. No high or costly stacks (a simple roof vent carries off combustion gases)—no special foundations needed. Fit low head-room areas — provide quick steaming, flexible operation to meet fluctuating loads — eliminate ash handling. Cleaver-Brooks boilers fully meet all codes — available in sizes 15 to 500 H.P. — 15 to 200 P.S.I. Write for new, just published catalog.

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331 East Keefe Avenue, Milwaukee 12, Wisconsin

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Cleaver-Brooks
STEAM BOILERS

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This cube melting in a man's hand is the metal—GALLIUM. Long recognized as an element, gallium is now commercially available. To what uses ingenious Americans will put it, is anyone's guess. Some already have started in a limited way.

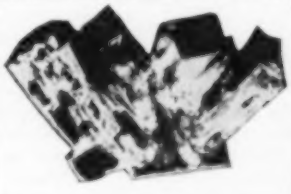
Every pound of bauxite, the ore from which aluminum is produced, contains a minute quantity of gallium. While no commercial method has been developed to extract all of this metal, Aluminum Company of America is now removing a small fraction of the gallium present in Alcoa bauxite, and is offering commercial quantities of it in high-purity metallic form.

Gallium presents properties that are indeed stimulating to scientists, researchers and development engineers—properties that open the door to possibilities in numerous fields.

Gallium has an unusually wide liquid range. Although it melts at body temperature, it will not boil until heated to about 3600° F. It "wets" the surface of many materials—can be painted on glass to make a brilliant mirror. And it expands when it solidifies.

We can't predict what the future holds for gallium, but we're betting there will be some amazing—and profitable—developments in the years to come. It may pay you to investigate this wonder metal. Gallium *could* mean a fortune to you!

Let us send you a free copy of our booklet *"Alcoa Gallium."* ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 602c Gulf Bldg., Pittsburgh 19, Pennsylvania.



When allowed to solidify in ample space, gallium forms beautiful orthorhombic crystals.

Alcoa Chemicals

ALCOA

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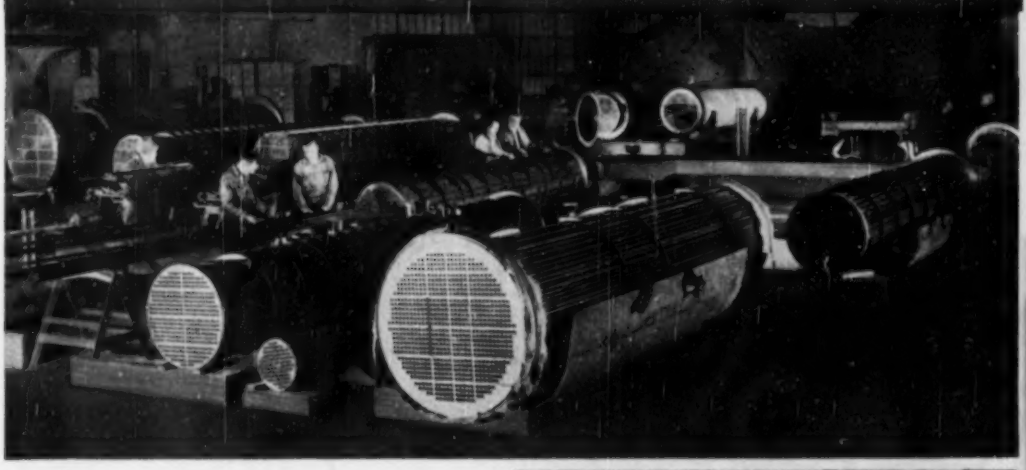
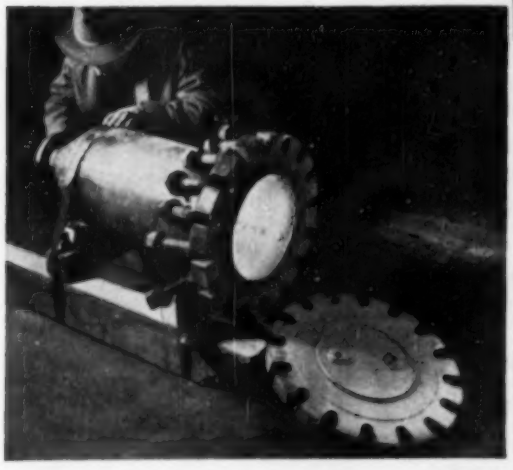


NO JOB IS TOO BIG — OR TOO SMALL. Heat exchangers for every service—large or small, hot or cold, high or low pressures—are engineered and built by A.O. Smith. Customers benefit from accumulated years of A. O. Smith experience in the use of a wide variety of materials.

NO PIG-IN-A-POKE HERE. The customer and A. O. Smith collaborated in the building of this SMITHway alloy-lined experimental pilot unit so that the alloy lining, selected by laboratory tests for corrosion service, could be subjected to process test-runs before the full-size production units were manufactured.



SAFEGUARDING THE CUSTOMER'S INVESTMENT. After the selection of the alloy lining, A.O. Smith makes doubly sure that it conforms to specifications, and does not contain any undesirable residual elements, by spectro-chemically analyzing sample coupons of the lining before releasing it for manufacture into the vessel.

A. O. Smith Corporation, Dept. CE-350
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WHERE you get it... DOES make a difference

When you place your order with Barrett you're assured prompt, dependable service and top quality products, backed by 96 years of successful manufacturing experience.

WHEN YOU NEED A COAL-TAR CHEMICAL

Phenols	Xylol	"ELASTEX" 28-P Plasticizer	Coal-tar Creosote
Cresols	Naphthalene	Niacin (Nicotinic Acid)	CUMAR* Paracoumarone-Indene Resin
Cresylic Acids	Hi-Flash Solvent	Pyridines	
Chlorinated Tar Acids	Phthalic Anhydride	Picolines	Carbonex* Rubber Compounding Hydrocarbon
Xylenols	Dibutyl Phthalate	Quinoline	
Pickling Inhibitors	"ELASTEX" DCHP Plasticizer	Tar Acid Oils	Bardol* Rubber Compounding Oil
Benzol	"ELASTEX" 10-P Plasticizer	Neutral Coal-tar Oils	Flotation Agents
Toluol	"ELASTEX" 50-B Plasticizer		

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

GET IT FROM Barrett

*Reg. U. S. Pat. Off.

NOW! AT NO INCREASE IN COST TO YOU

Makes a good steam trap better

Nearly 650,000 Yarway Impulse Steam Traps have already been installed—proof that they are doing a good job.

Now a *stainless steel* body makes this famous little trap even *better—at no increase in cost.*

Better in *wear*, better in *service*. Users will find Yarways require less maintenance than ever. All parts are wear-resistant, practically wear-proof. There is only one moving part, a small, stainless steel, heat-treated valve. Important, too—Yarway Impulse Traps are *suitable for all pressures up to specified maximum without change of valve or seat.*

Other popular advantages are *small size, light weight, easy installation* and *low cost.* Often it costs *less* to buy a new Yarway trap than to repair an old, ordinary trap.

In performance—ask any user. They all say Yarways are the traps that *get equipment hotter sooner and keep it hot!*

For better steam trap performance, try *new* stainless steel Yarways.

YARWAY IMPULSE STEAM TRAPS ARE SOLD BY OVER 200 DISTRIBUTORS. THERE IS ONE NEAR YOU.

Write for name and address.

YARNALL-WARING COMPANY
137 Mermaid Avenue, Philadelphia 18, Pa.

YARWAY IMPULSE STEAM TRAP

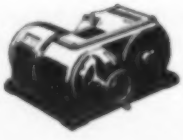
"...499 suggestions for Reeves Speed Control and one for television in the locker rooms."

THE 3 BASIC REEVES UNITS

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 10:1. Sizes—fractional to 87 hp.

VARI SPEED MOTOR PULLEY provides an instantly variable speed drive within 4:1 ratio for any constant speed motor. Sizes to 10 hp.

MOTODRIVE combines motor, speed varying mechanism and reduction gears in single unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 20 hp.



The benefits of REEVES Speed Control, applied to your production machines, will be immediately apparent to everyone in your organization. Management will see it in production, sales and financial reports. The man at the machine will see it in the almost effortless ease with which he turns out *more and better work.* For the right speed for every operation and every operator under every changing operating condition, install REEVES Variable Speed Drives and Controls on your present machines . . . demand them on the new machines you buy. Write for full details on the complete REEVES line. Ask for the new, 132-page Catalog No. CE25-3N.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized Leader in the Specialized Field of Speed Control Engineering

ACCURATE • VARIABLE

Reeves Speed Control

GIVES THE RIGHT SPEED FOR EVERY JOB!

Now NIAGARA adds

SELF CLEANING

TO ITS LONG LIST OF FEATURES

"Auto-Sluice" Removes 35 Cu. Ft. Filter Cake in 15 Minutes Automatically

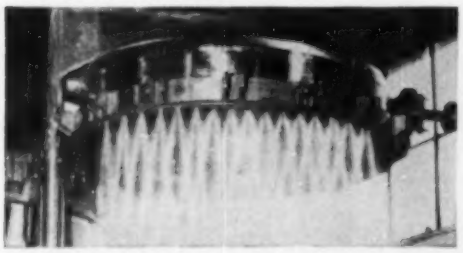
No more do you have to open the filter at the end of each cycle to sluice the cake from the leaves. Niagara now offers the "Auto-Sluice" filter which permits automatic cake removal and disposal. A special filter cover is fitted with a header and special spray nozzles so located and directed that sprays strike the cake of each leaf. This sluice header is actuated by air motors which impart both a rotary and reciprocating motion assuring thorough sluicing of all surfaces.

The new Niagara "Auto-Sluice" can remove filter cakes up to 35 cubic feet in as little as 15 minutes with only two or three cubic feet of water per cu. ft. of filter cake.

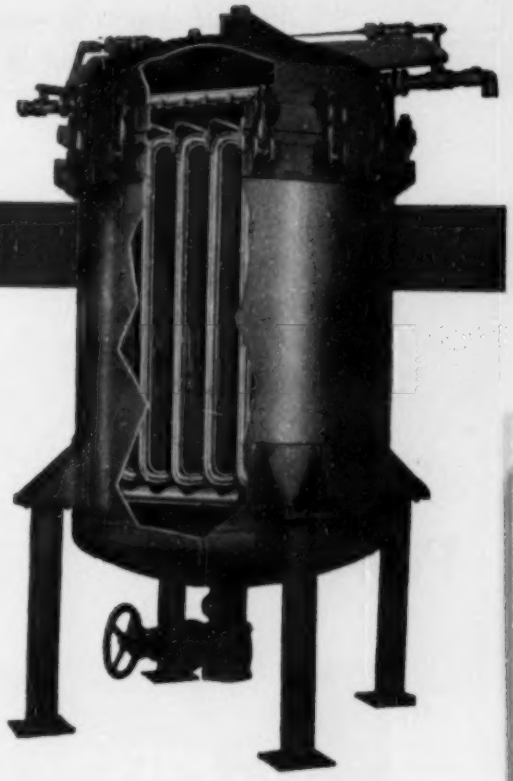
Here are savings in time, labor and sluice water consumption you cannot afford to overlook. Send for literature on this new Niagara Filter which has already proved its ability to effect sizeable savings in sugar, food, and chemical plants.

Add these "Auto-Sluice" Features to Niagara's Stainless, Clothless Filters

* *Trade Mark Patent Applied For.*



Testing "Auto-Sluice" sprays with cover open. These powerful sprays, in the course of each full rotary and reciprocating stroke, cover the entire filter leaf area.



1. **Reduction of Labor Costs.** Eliminates opening and manual cleaning of filter after each cycle.
2. **Reduction of Unproductive Time.** Short sluicing time increases productive filtration time and capacity.
3. **One Man Battery Operation.** A battery of as many as six Niagara "Auto-Sluice" Filters can be handled by one operator.
4. **Automatic Filter Cake Handling.** Totally closed system for removing cake from leaves and discharging to sewer or for recovery.

Niagara Filter CORPORATION

3084 MAIN ST., BUFFALO 14, N. Y.

NIAGARA FILTER CORP., 3084 Main St., Buffalo, N. Y.
Please send me literature on the Niagara "Auto-Sluice" Filter.

NAME .....

TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

In an effort to increase the efficiency of his plant, a salt manufacturer called on EBASCO for a power survey and recommendations for plant modernization.

How an EBASCO Power Survey

. . . saved a Salt Plant $200,000 a year

Ebasco Specialists computed an accurate heat balance of the plant operation, suggested numerous changes in equipment and piping, and redesigned the boiler settings.

As a Result of these and other improvements, the manufacturer effected a saving in coal consumption estimated at more than $200,000 per year, with a 45% boost in salt production. Make-up water was cut from 37% to less than 1% and compressed air consumption was reduced to one fourth of the former amount.

Such benefits are typical of those manufacturers receive when they modernize their plants with EBASCO's help. For *specialized* assistance on any plant modernization problem, call EBASCO to get the job done quickly, efficiently—in the way that will best meet your requirements.

Write for the booklet, "*The Inside Story of Outside Help*" describing the many EBASCO services available to you. Ebasco Services Incorporated, Dept. J, Two Rector Street, New York 6, N. Y.

ENGINEERS · CONSTRUCTORS · BUSINESS CONSULTANTS

EBASCO

Appraisal	Design & Construction	Insurance & Pensions	Sales & Marketing
Budget	Financial	Purchasing	Systems & Methods
Business Studies	Industrial Relations	Rates & Pricing	Taxes
Consulting Engineering	Inspection & Expediting	Research	Traffic

EBASCO SERVICES

INCORPORATED

NEW YORK · CHICAGO · WASHINGTON, D. C.

Ebasco Teamwork gets things done anywhere in the world

7 Reasons-

THEY'RE ADAPTABLE!

Pillow blocks available with fixed or floating bearing. (Fixed bearing shown)

THEY CARRY THEIR FULL LOAD!

Self-aligning double row of concave rollers between convex raceways provide full contact, full load capacity, even with shaft deflection or misalignment.

CLEAN OPERATION

Effective seal keeps grease or oil in, dirt out!

FEWER GREASINGS!

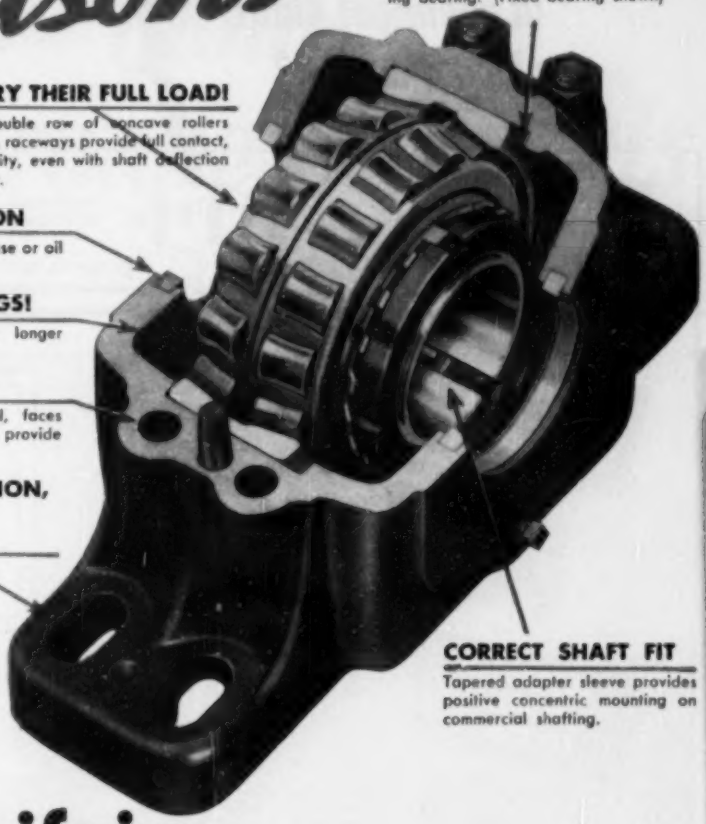
Large reservoir allows longer greasing intervals.

PRECISION FIT

Base and cap doweled, faces accurately ground, to provide leak-proof joint.

EASY INSTALLATION, INSPECTION, DISASSEMBLY

Rugged, two-piece cast housing is simple, with slotted bolt holes for easy mounting.



CORRECT SHAFT FIT

Tapered adapter sleeve provides positive concentric mounting on commercial shafting.

for Specifying

Better and longer service are your prime considerations in choosing such vital equipment as ball and roller bearings. Every feature of Link-Belt bearings is calculated to contribute to their efficiency and endurance. The engineering knowledge of the Link-Belt organization and the unexcelled facilities of a plant devoted entirely to manufacturing precision ball and roller bearings are your assurance of maximum service.

Illustrated above is Series 6800 Roller Bearing Pillow Block, tapered adapter sleeve type; also made in Series 7800 and 7900 press fit type for precision shafting. Other standard models are available in ball and roller bearing types, for various shaft sizes, solid or split housings, open or closed ends, in pillow blocks, cartridge, flanged cartridge, flanged, hanger and takeup blocks. Available from stock at factory branch stores and distributors located throughout the nation and many representatives in other countries of the world.

Complete data in Catalog 2550. Send for your copy.

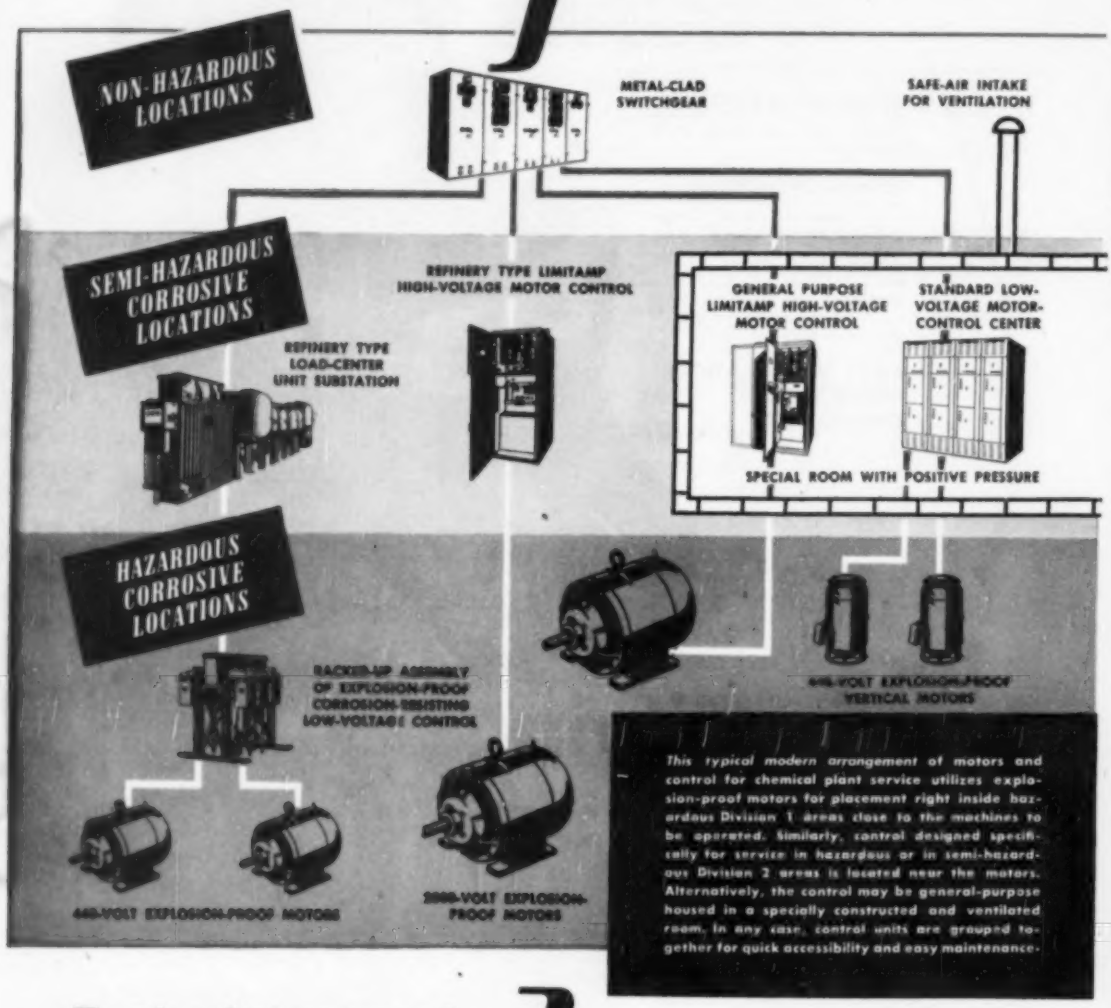
LINK-BELT
Self-Aligning
BALL and ROLLER BEARINGS

THE SYMBOL OF QUALITY — LB — LINK-BELT

LINK-BELT COMPANY

Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities.

What's the trend in chemical plant electrification? } wider use of explosion-proof


NON-HAZARDOUS LOCATIONS
METAL-CLAD SWITCHGEAR
SAFE-AIR INTAKE FOR VENTILATION
SEMI-HAZARDOUS CORROSIVE LOCATIONS
REFINERY TYPE LIMITAMP HIGH-VOLTAGE MOTOR CONTROL
REFINERY TYPE LOAD-CENTER UNIT SUBSTATION
GENERAL PURPOSE LIMITAMP HIGH-VOLTAGE MOTOR CONTROL
STANDARD LOW-VOLTAGE MOTOR-CONTROL CENTER
SPECIAL ROOM WITH POSITIVE PRESSURE
HAZARDOUS CORROSIVE LOCATIONS
BACKED-UP ASSEMBLY OF EXPLOSION-PROOF CORROSION-RESISTING LOW-VOLTAGE CONTROL
440-VOLT EXPLOSION-PROOF VERTICAL MOTORS
440-VOLT EXPLOSION-PROOF MOTORS
2300-VOLT EXPLOSION-PROOF MOTORS

This typical modern arrangement of motors and control for chemical plant service utilizes explosion-proof motors for placement right inside hazardous Division 1 areas close to the machines to be operated. Similarly, control designed specifically for service in hazardous or in semi-hazardous Division 2 areas is located near the motors. Alternatively, the control may be general-purpose housed in a specially constructed and ventilated room. In any case, control units are grouped together for quick accessibility and easy maintenance.

Here's what you need in motors and control for hazardous areas! }

WHEN YOU COME TO GENERAL ELECTRIC you get far more than the finest in electrical equipment. A General Electric application engineer, familiar with chemical plant practice, is at your disposal. If desired, he stands ready to take over the job of co-ordinating all the needed components, engineering your power distribution and utilization equipment into one modern efficient system.

corrosion-resisting **motors and grouped controls**

— to simplify plant layouts, cut special construction costs!

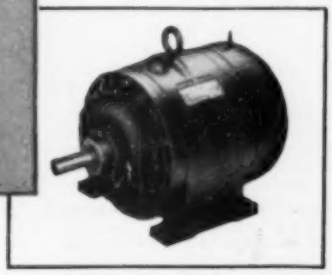
There are more ways than one, of course, to meet hazardous chemical-plant conditions. But because it best combines simplicity, security, and savings, today's trend is toward greater use of explosion-proof, corrosion-resisting motors and group installation of control centers.

Its advantages? Motors and control can be located solely with reference to convenience, accessibility for maintenance, economy of space, and driving machinery. And because it's standard equipment, initial cost is lower.

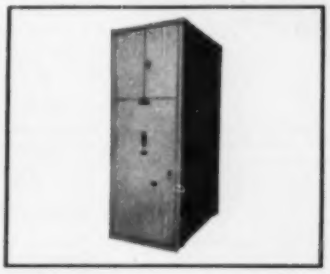
By minimizing explosion hazards, you promote personnel safety and continuity of production. Moreover, you can take full advantage of the cost-saving benefits of the load-center system of power distribution. Full information on motors and control for hazardous areas is contained in Bulletin GEA-4131. We'll gladly send you a copy. ***Apparatus Dept., General Electric Company, Schenectady 5, N. Y.***

Have you seen the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution"? Ask your G-E representative to arrange a showing for your organization.

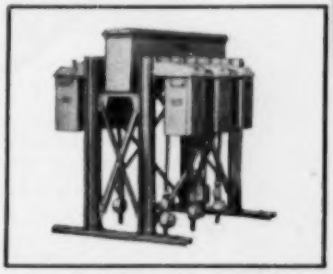
To meet chemical plant conditions and code requirements for hazardous areas, General Electric builds the most extensive line of explosion-proof motors on the market, in the widest variety of types, sizes, and ratings, and for the greatest number of hazardous conditions. In high- and low-voltage control, too, you have an unusually broad range to select from, made especially for use in hazardous and corrosive atmospheres. Let an experienced G-E engineer help you select the right combination for *your* special needs. Take the first step now—just call him at your nearest G-E office.



G-E Tri-Clad explosion-proof motors for Class I Group D hazardous locations have strong cast-iron frames and end shields. Non-sparking Textolite cooling fans standard on smaller sizes for greatest corrosion resistance.

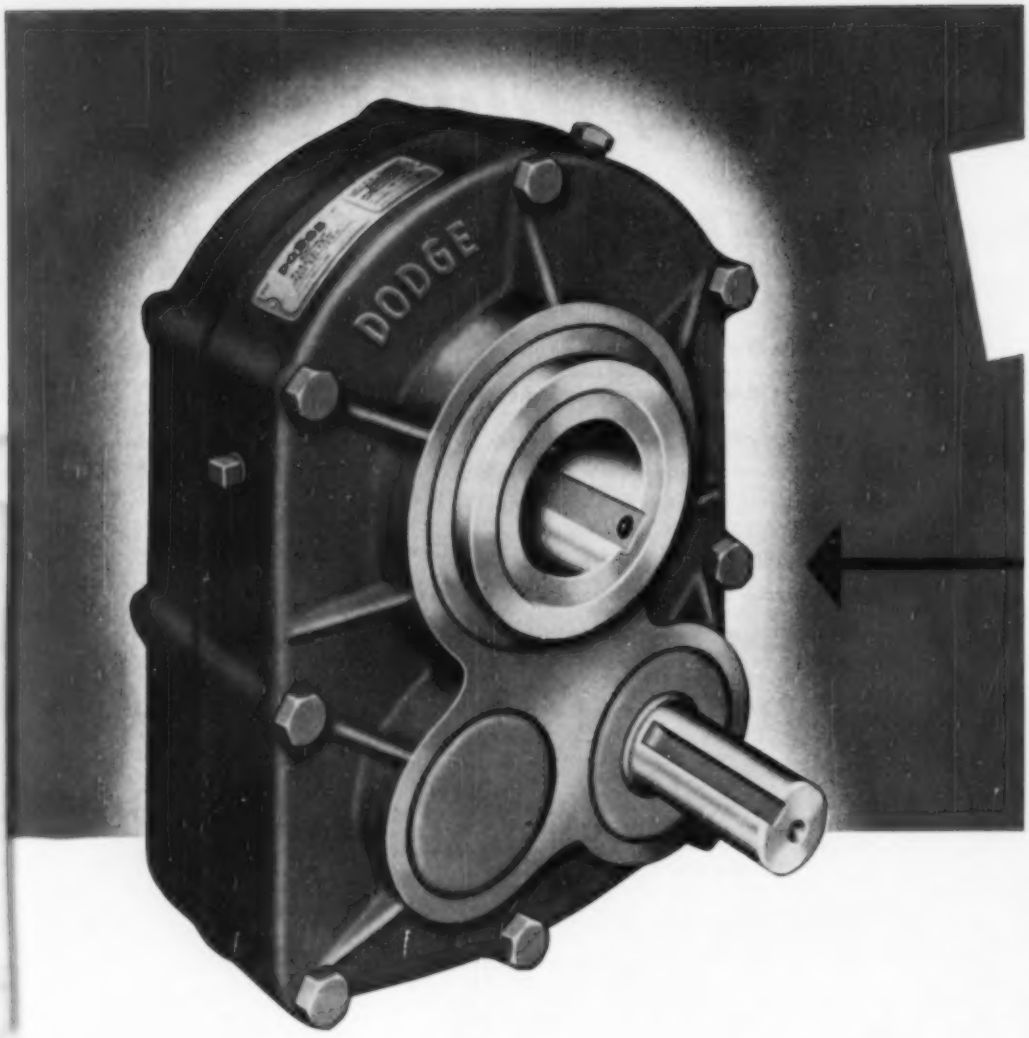


G-E Limitamp high-voltage motor controls for semi-hazardous Class I Group D Division 2 areas—factory-assembled, space-saving units—give adequate short-circuit protection with high-IC current-limiting fuses.



G-E low-voltage control for hazardous Class I Group D Division 1 areas—in these convenient, racked-up standard assemblies of combination starters and breakers—save installation time, simplify maintenance.

GENERAL ELECTRIC



- Available from *stock*, with stock-product economy. Built in six sizes with capacities up to 25 H.P. Develops any output speed from 13 to 133 R.P.M. through the use of stock TAPER-LOCK sheaves as prescribed for the job.
- No special engineering required. No foundation to provide. No flexible couplings. No sliding base. No "lining-up" difficulties. No expensive installation.
- Reducer locks on the shaft-to-be-driven with a steel locking collar on *each side* of unit.
- Unit is driven through any V-Belt Drive. This absorbs shock loads. Speeds can be varied by simple change of sheave. Interchangeable bushings adapt shaft sleeve to different shaft sizes, making application to other machines practical and easy.
- Torque arm, fastened to floor or any fixed object, anchors the reducer unit. Turnbuckle in torque arm provides fast and accurate adjustment of belt tension.
- Extremely compact, light. (Size No. 1 weighs only 35 pounds.) Extremely rugged. Cast iron housing. Double reduction train of helical steel gears. Shaved for *quiet* operation—heat treated for *long* life. Generous capacity deep groove ball bearings. Neoprene seals.
- Backstop available when required. Simple and positive. Easily installed on input shaft. Sealed from dust and dirt inside the reducer case.
- The TORQUE-ARM SPEED REDUCER is a *DODGE* product—which means *fine* engineering, *quality* manufacture. Get all the facts. ***WRITE*** for bulletin with selection tables.

NEW!

TORQUE-ARM SPEED REDUCER

SAVES MONEY!

The Dodge TORQUE-ARM SPEED REDUCER is a new tool for the mechanical transmission of power, so practical in design, so effective in operation, so low in cost, that it promises to benefit industry as extensively as the famous Dodge-Timken Bearing, the Dodge Rolling Grip Clutch, the Dodge Taper-Lock Sheave and other Dodge "firsts."

If you use conveyors of any kind, bucket elevators, agitators, mixers, feeders, processors or similar machinery—here is your opportunity to improve your drives, reduce maintenance and make substantial savings on equipment and installation.

See your local Dodge Distributor. Simply give him your horsepower requirement and the desired speed and size of the shaft to be driven. He will furnish you *from stock* this complete speed reducer package, to fit your job accurately, economically.

WRITE to us for Bulletin No. A470 with details, specifications and easy-to-use selection tables.

DODGE MANUFACTURING CORPORATION • 200 UNION STREET, MISHAWAKA, INDIANA

CALL THE TRANSMISSIONEER, your local Dodge Distributor, for information on new ways to improve machine performance, cut costs. Look for his name under "Power Transmission Equipment" in your classified telephone book.

DODGE

of Mishawaka, Ind.

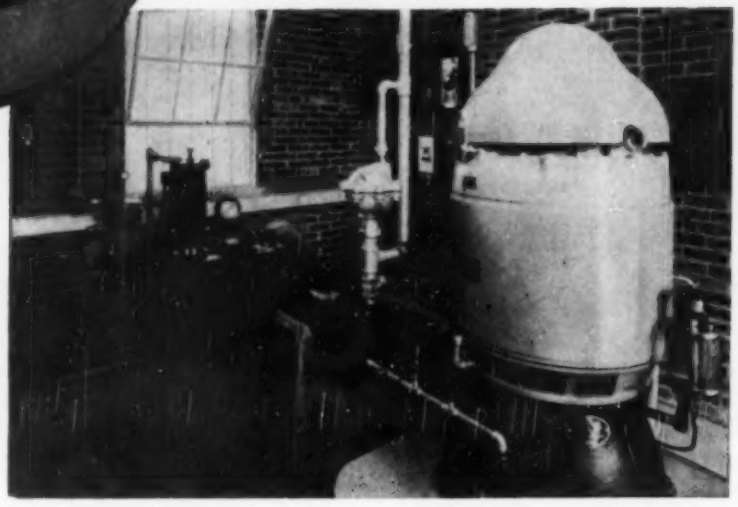
FIRST IN POWER TRANSMISSION MACHINERY

AFTER *9 Years* OF CONTINUOUS SERVICE . . .

BACK ON THE JOB

. . . BECAUSE IT'S

NI-RESIST



Ni-Resist bowls and impellers are used in Layne & Bowler multi-stage pumps of this type, operated by the Wichita Water Works and pumping 1000 to 1800 g.p.m. at 1170 r.p.m. They are reported to show practically no material decrease in delivery rate during the 9-year period.

NI-RESIST* is a machinable high nickel alloy cast iron that resists corrosive attacks of *acids, alkalies* and *salts* . . . curbs wear . . . and withstands heat.

Compare its performance with that of any other cast iron now used for resisting *corrosion, erosion* and *metal-to-metal wear* . . .

The Ni-Resist casting, pictured above, is an example of the excellent condition of Ni-Resist bowls and impellers in some 25 pumps of the Wichita, Kansas, Water Supply, *after nine years of practically continuous operation.*

Before inspection, approximately 45 billion gallons of water were pumped by these 25 units, manufactured by Layne & Bowler, Inc., Memphis, Tenn. As a result of this record, ten L & B pumps with Ni-Resist bowl assemblies, were specified for new wells added in 1948.

Prolong the life of your equipment . . . minimize contamination . . . keep product purity *high* while holding process costs *low* . . . by using Ni-Resist. Ask for complete information.

*Reg. U. S. Pat. Off.

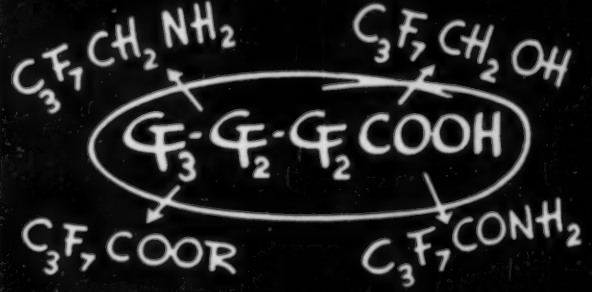
EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

a new reactive fluorochemical

A FLUOROCARBON with a functional group

HEPTAFLUOROBUTYRIC ACID



Heptafluorobutyric acid is a new reactive Fluorochemical recently discovered in the research laboratories of the 3 M Company. It qualifies as one of the strongest of organic acids. The heptafluoropropyl group can be introduced into a wide variety of organic compounds by the preparation of the primary and secondary derivatives of this acid, such as salts, esters, acid halides, amides, amines, alcohols, nitriles, the anhydride and aldehyde.

Availability is limited to experimental quantities.

Write Dept. CE-350 for research samples and brochure describing typical reactions.

CHARACTERISTIC PHYSICAL PROPERTIES OF HEPTAFLUOROBUTYRIC ACID

FORMULA WEIGHT	214
BOILING POINT	120°C @ 735 mm
MELTING POINT	−17.5°C
DENSITY d_4^{25}	1.641 g/cc
REFRACTIVE INDEX n_D^{25}	1.290

ANOTHER 3M COMPANY PRODUCT

made in U.S.A. by MINNESOTA MINING & MANUFACTURING CO. St. Paul 6, Minn.
also makers of "SCOTCH" Brand Pressure-Sensitive Tapes, "UNDERSEAL" Rubberized Coating, "SCOTCHLITE" Reflective Sheeting, "SAFETY-WALK" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives.

General Export: Durex Abrasives Corp., 240 North Ave., New Rochelle, N. Y. *In Canada* Canadian Durex Abrasives Ltd., Brantford, Ontario

POWELL VALVES have *these* "ABILITIES" to a high degree:

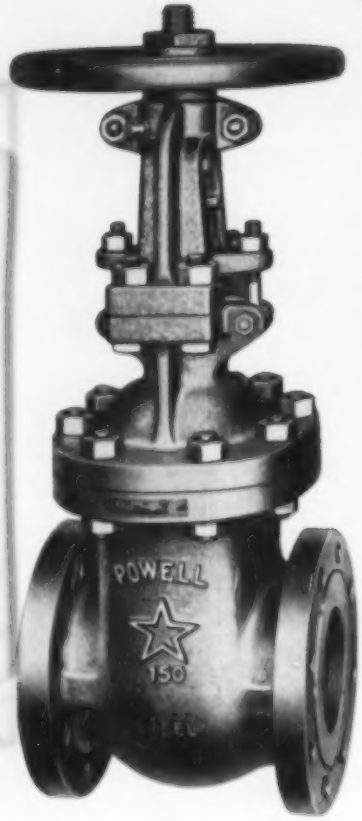


Fig. 1803—Class 150-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke, tapered solid wedge.

Fig. 1832—200-pound Stainless Steel Gate Valve with screwed ends, screwed-in bonnet and inside screw rising stem.

Fig. 1861—200-pound Stainless Steel Globe Valve with screwed ends, union bonnet, inside screw stem and plug type disc.

Bell-O-Seal "Y" Valve. Powell Bellows Sealed Valves—Globe and "Y" patterns—are designed for high vacuum service and for installations where packing is unsatisfactory or fails frequently. Available in 18-8S, 18-8S Mo., Hastelloy and Monel Metal. Made in sizes ¼" to 12", inclusive.

POWELL

ADAPTABILITY. The Powell Line is so complete* that there's a Powell Valve especially adapted, in design and material, to meet the requirements of each and every industrial flow control service.

DURABILITY. Powell Valves are noted for their durability. That is because each Powell Valve is built to stand up under the specific flow control conditions to which it may be subjected.

DEPENDABILITY. Every Powell Valve is specifically designed to give dependable, uninterrupted service over a long period of time. That is why Powell Valves reduce costly "down time" for maintenance to a minimum.

Fig. 1944—Large 150-pound Stainless Steel "Y" Valve with flanged ends, bolted flanged yoke-bonnet and outside screw rising stem. Sizes 2½" to 12", inclusive.

Fig. 1816—Large 125-pound All Iron Gate Valve. Made in sizes 2" to 30", incl. Has bolted flanged yoke, outside screw rising stem and tapered solid wedge.

Fig. 375—200-pound Bronze Gate Valve. Screwed ends, union bonnet, inside screw rising stem and renewable "Powellium" wear-resisting nickel-bronze disc.

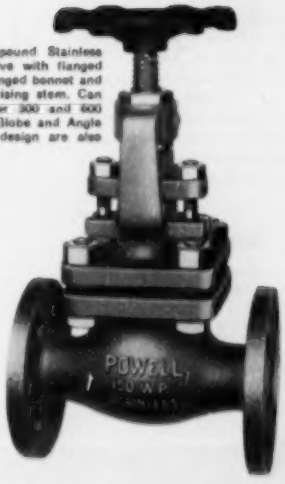


Fig. 1969—150-pound Stainless Steel Gate Valve with flanged ends, bolted flanged bonnet and outside screw rising stem. Can be furnished for 300 and 600 pounds W. P. Globe and Angle valves in this design are also available.

***The Complete Powell Line includes Globe, Angle, "Y", Gate, Check, Non-return, Relief, and Flush Bottom Tank Valves in Bronze, Iron, Steel and a wide range of Corrosion-resistant metals and alloys.**

Ask your nearest Distributor—or write direct

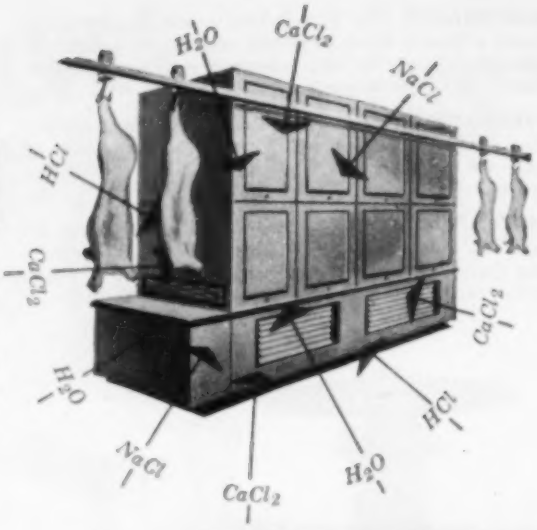
The Wm. Powell Company, Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

VALVES

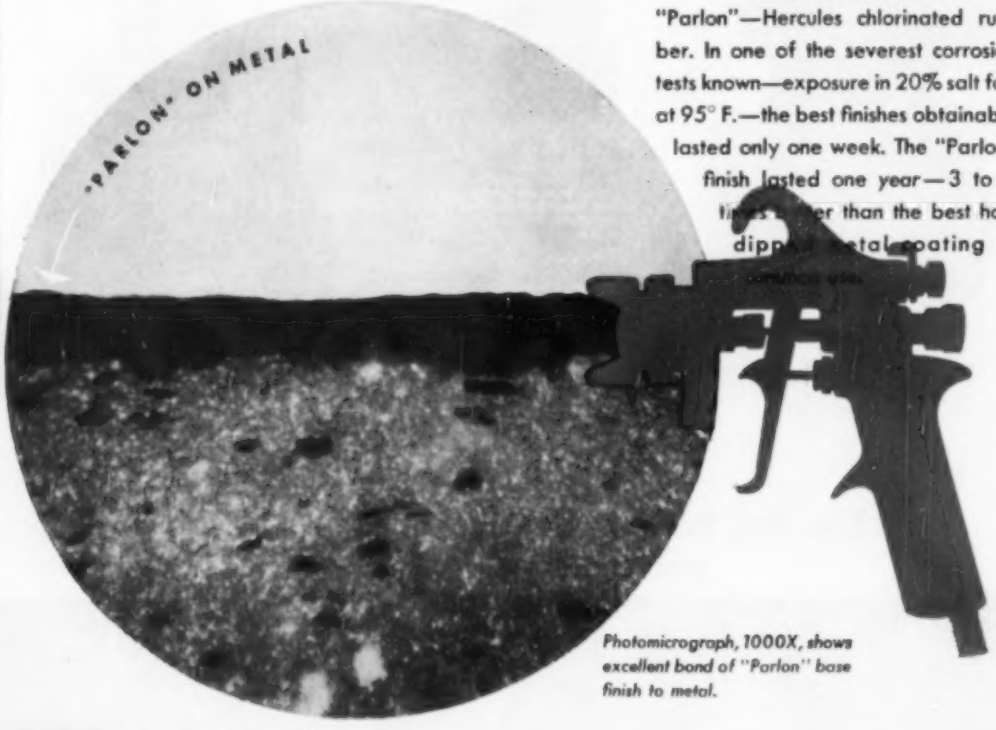
PROBLEM...

. . . to find a surface coating which would provide superior protection for industrial refrigeration and air conditioning equipment against moisture and the variety of chemicals encountered in the operation of this equipment.



SOLUTION...

. . . a baking-type finish based on "Parlon"—Hercules chlorinated rubber. In one of the severest corrosion tests known—exposure in 20% salt fog at 95° F.—the best finishes obtainable lasted only one week. The "Parlon" finish lasted one year—3 to 4 ti[illegible]er than the best hot-dipp[illegible]tal coating in [illegible]



Photomicrograph, 1000X, shows excellent bond of "Parlon" base finish to metal.

HERCULES SYNTHETIC RESINS · CELLULOSE PRODUCTS · TERPENE CHEMICALS

WHICH IS THE BEST CORROSION CHASER? For one large manufacturer of refrigeration equipment, it proved to be a finish based on "Parlon"—a product of Hercules research in chlorinated chemicals. By far the most durable of all finishes tested, it has solved the corrosion problems on all this company's products.

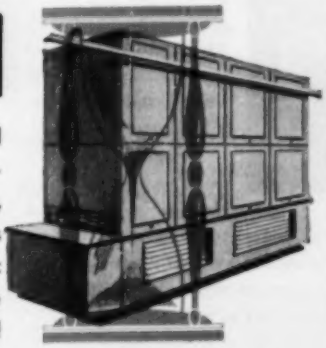
"Parlon" is used to impart chemical and moisture resistance to many types of coatings, both air-drying and heat-reactive. For example, industrial maintenance coatings, marine finishes, highway markings, concrete floor paints. It also makes fast-drying and alkali-resistant inks for soap wrappers, adhesives for bonding dissimilar materials, waterproof paper lacquers, textile impregnants.

We would like to tell you more about "Parlon" and the many other Hercules chemical materials that are serving industry, and to work with you toward a solution to your product processing or finishing problems.

HERCULES POWDER COMPANY 992 Market Street, Wilmington 99, Del.
Sales offices in principal cities

RESULT...

. . . equipment of ordinary sheet steel now withstands far longer the corrosive action of water, sodium chloride, calcium chloride, and other chemicals used in cooling—even the hydrochloric acid used periodically to remove lime encrustations caused by hard water!



"PARLON," "METALYN," AND "POLY-PALE" ARE HERCULES TRADE-MARKS

Large-Scale Samples

The latest addition to Hercules extensive research facilities is the new large-scale samples laboratory at the Experiment Station in Wilmington, Delaware.

This new laboratory bridges the gap between laboratory development and pilot plant stages. Hercules can process samples of chemicals in development, for field trials on a much larger scale than is possible in a laboratory and still not have to go to pilot plant production. Already, samples ranging from 10 to 10,000 pounds have been processed in this new laboratory.

The large-scale samples laboratory is flexible enough to accommodate a wide variety of organic chemical processes with a minimum of fixed equipment changes. Operations can be conducted at temperatures from minus 50° to plus 350°C. Most of the equipment is set up in duplicate with nickel for high pH conditions, and nonmetallic equipment (glass-lined steel, Pyrex, porcelain) for the low pH ranges.

Floor Covering Binder

Poly-Pale® resins are being used to a large extent as a resin binder for certain types of floor coverings, particularly linoleum, and for floor tiles.

Better "Handling" Plastic

Kitchen tool handles molded with high-acetyl cellulose acetate show good color and form retention even after prolonged and repeated immersions in boiling water. This performance cannot be matched by any other low-cost thermoplastic now available.

Low-Cost Tall Oil Ester

The introduction of "Metalyn" makes commercially available for the first time a low viscosity, light colored, highly refined, neutral ester of tall oil. This low cost material has a high viscosity index, high degree of unsaturation and a very low acid number. The unusual combination of advantages possessed by "Metalyn" make it particularly suitable as a base for lubricating oil additives and as a secondary plasticizer for vinyl resins in applications where aging characteristics are not critical.

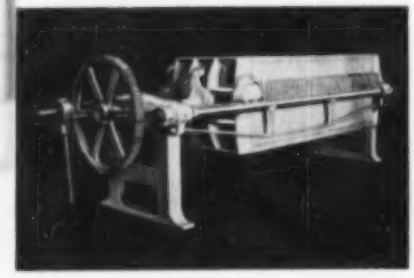
ROSIN AND ROSIN DERIVATIVES • CHLORINATED PRODUCTS • AND OTHER CHEMICAL MATERIALS FOR INDUSTRY

GC50-2

Simplicity of design, economy of operation, flexibility of application

SPERRY FILTER PRESSES

These three advantages...simplicity, economy, flexibility...are the reasons for the virtually universal acceptance of the plate filter press as engineered for your process operation by Sperry. Here is what these advantages mean.



Simplicity of design results in a minimum investment in processing equipment and a minimum cost for installation. And, once installed, operation is trouble-free.

Simplicity of design results, too, in economy of operation with no skilled or technical personnel required to obtain first quality results. The simplest types of filter cloth and paper may be used just as they are cut from the roll. The filtrate is of maximum clarity, the cake is delivered thoroughly washed and in slab form ready for the drier trays.

Regardless of filter mixture, Sperry presses have the flexibility required to handle it successfully. Pressures and temperatures pose no problem; nor does resistance to acids or alkalies. The liquid need not be exposed to the atmosphere and the filtrate may be delivered to a point higher than the filter. All types of filter bases may be used and varied at minimum cost should your processing plans be revised.

Whatever your filtration problem, you will find the answer in simplicity, economy and flexibility . . . the advantages offered by the Sperry plate filter press. Why not put Sperry's fifty years experience to work on this problem now? There is no obligation.

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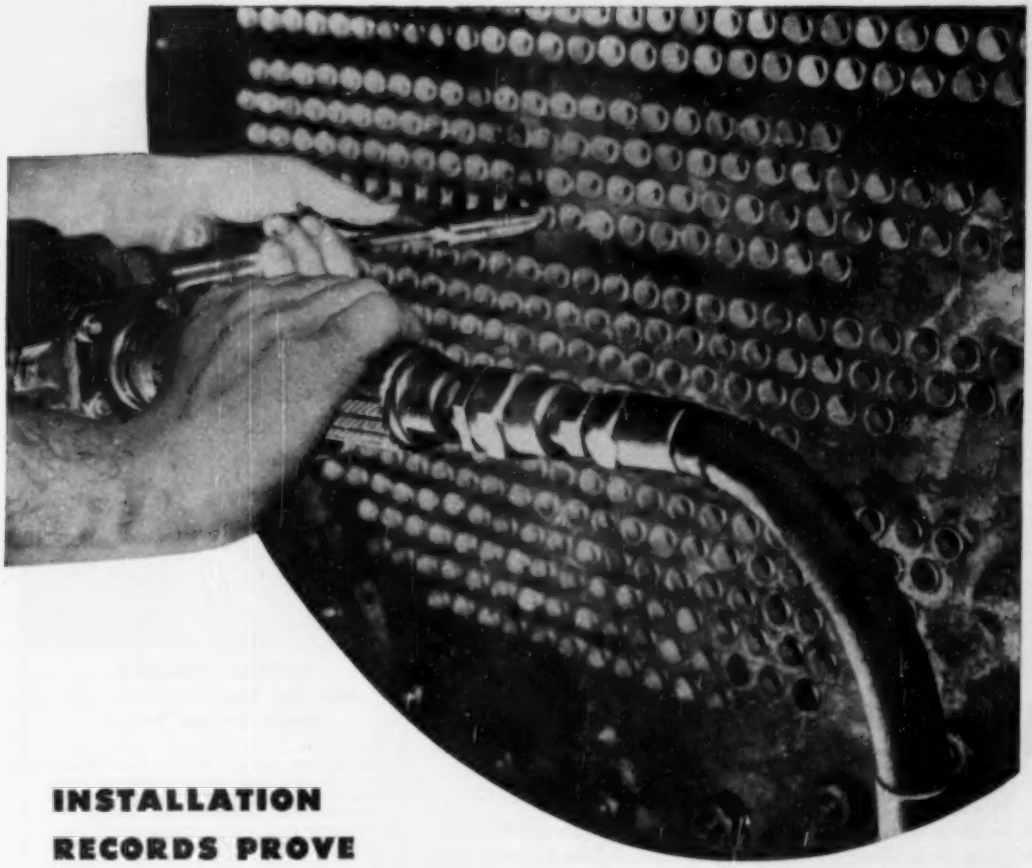

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To Meet Your Own Requirements

A leading builder of industrial locomotives since 1874, the Vulcan Iron Works has always specialized in custom-built units, modified as required to give maximum efficiency and economy under the purchaser's own particular operating conditions. So many different types and sizes of locomotives have been built, however, during this long period of time that there is now practically no industrial haulage or switching requirement for which we cannot offer a well-proved model which will need only minor changes, if any, to be entirely satisfactory.

Write us regarding any locomotive requirement—Diesel-Electric, Diesel-Mechanical, Steam or "Fireless." Our engineers welcome opportunities to make helpful suggestions without charge or obligation of any kind. Proposals include complete specifications—usually accompanied by photographs of Vulcan locomotives already giving money-saving service under comparable operating conditions.

REPEAT ORDERS are the best evidence of Money-Saving Service

The 22½ ton narrow-gauge Diesel Electric Locomotive shown above was shipped, early in 1946, to a cement plant in Egypt. SPECIAL FEATURES include bronze-cloth screens to keep dust out of the generator and motor, spring-loaded couplers and buffers, and six driving wheels to assure safe operation on relatively light track. STANDARD FEATURES, that have proved their value to many other users, include heat-treated cast-steel side frames and bumpers, over-capacity semi-elliptic cross-equalized springs and cast-steel gear case with double oil-seals and oil-level gauges.

After more than two years of satisfactory experience with this locomotive, the purchaser ordered two more, to be similar in every respect; both of which have since been built and shipped.

Scores of other Repeat Orders for Vulcan locomotives could be mentioned—some large organizations having re-ordered time after time throughout all the long period of transition from steam-power to gasoline, Diesel and Diesel-electric power. In every case there has been only one real reason: SATISFACTORY SERVICE AT LOWEST ULTIMATE EXPENSE.

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Diesel and Gasoline Locomotives	Rotary Retorts, Calciners, Etc.	Heavy-Duty Briquetting Machines	Self-Contained Electric Hoists
Diesel-Electric Locomotives	Improved Vertical Lime Kilns	Ball, Rod and Tube Mills	Cast-Steel Sheaves and Gears
Electric Locomotives and Larrys	Automatic Quick-Lime Hydrators	Shaking-Chute and Chain Conveyors	Open-Hearth Steel Castings

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Whether you now use glycerine or just wonder about its possibilities . . . whether you're in management, production, or research . . . an expert on glycerine, or thoroughly unfamiliar with the subject—you'll want this informative booklet. Write for your free copy—today! *Address: Dept. 1, Glycerine Producers' Association, 295 Madison Avenue, New York 17, New York.*

One of a series of five booklets on the industrial applications of glycerine. Also available on request: Why Glycerine? (a general survey of all main uses) . . . Why Glycerine for Drugs and Cosmetics? . . . Why Glycerine for Foods? . . . Why Glycerine for Textiles?

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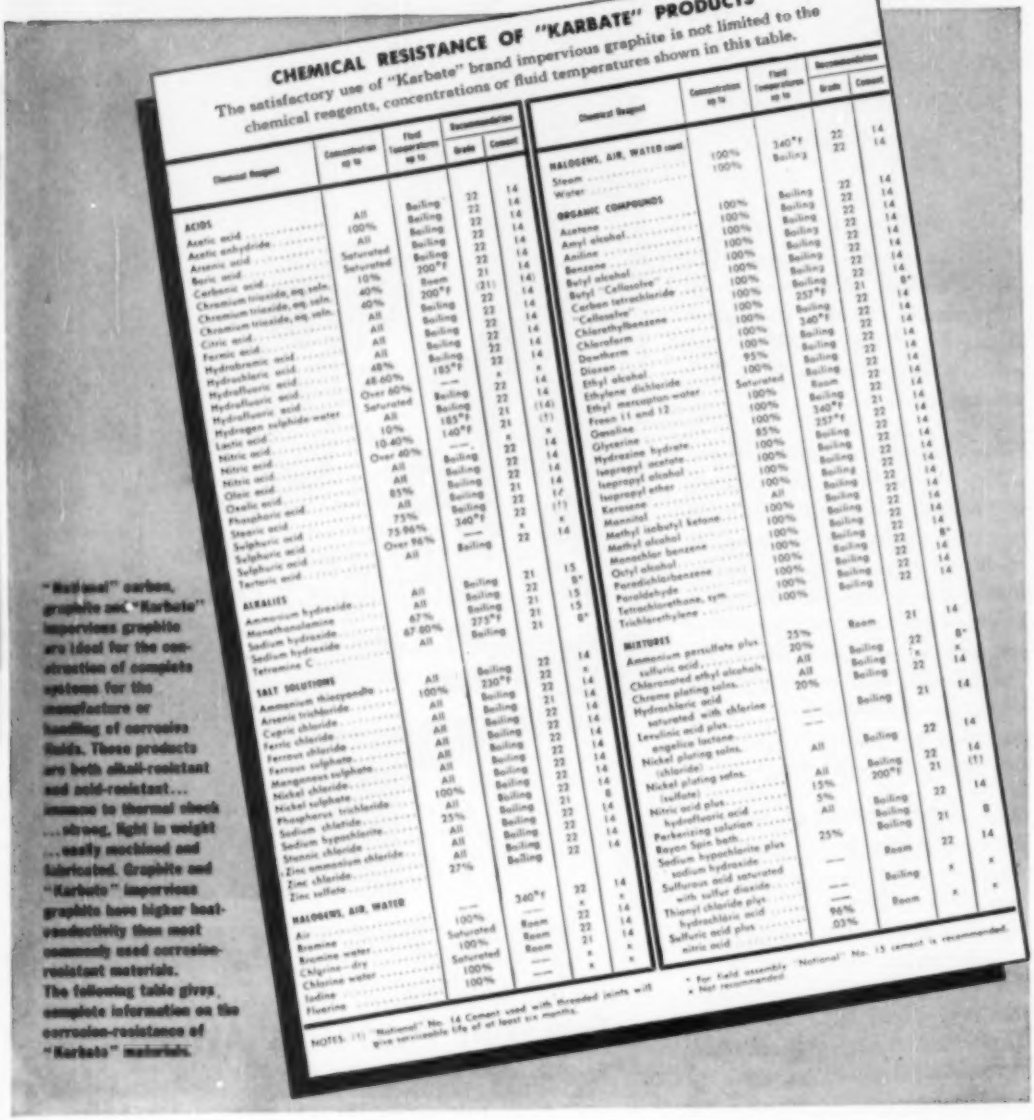
295 Madison Avenue, New York 17, N. Y.

CORROSION



CHEMICAL RESISTANCE OF "KARBATE" PRODUCTS

The satisfactory use of "Karbate" brand impervious graphite is not limited to the chemical reagents, concentrations or fluid temperatures shown in this table.

Chemical Reagent	Concentration up to	Fluid temperatures up to	Recommendation: Grade	Recommendation: Cement
ACIDS				
Acetic acid	All	Boiling	22	14
Acetic anhydride	100%	Boiling	22	14
Arsenic acid	All	Boiling	22	14
Boric acid	Saturated	Boiling	22	14
Carbonic acid	Saturated	200°F	22	14
Chromium trioxide, aq. soln.	10%	Room	21	14
Chromium trioxide, aq. soln.	40%	200°F	(21)	(14)
Chromium trioxide, aq. soln.	60%	Boiling	22	14
Citric acid	All	Boiling	22	14
Fermic acid	All	Boiling	22	14
Hydrobromic acid	All	Boiling	22	14
Hydrochloric acid	48%	185°F	22	14
Hydrofluoric acid	48.60%	—	x	x
Hydrofluoric acid	Over 60%	Boiling	22	14
Hydrofluoric acid	Saturated	Boiling	22	14
Hydrogen sulphide water	All	185°F	21	(14)
Lactic acid	10%	140°F	(1)	(1)
Nitric acid	10-40%	—	x	x
Nitric acid	Over 40%	Boiling	22	14
Nitric acid	All	Boiling	22	14
Oleic acid	All	Boiling	22	14
Oxalic acid	85%	Boiling	21	14
Phosphoric acid	All	Boiling	22	14
Stearic acid	75%	340°F	(1)	(1)
Sulphuric acid	75-96%	—	x	x
Sulphuric acid	Over 96%	Boiling	22	14
Sulphurous acid	All			
Tartaric acid				
ALKALIES				
Ammonium hydroxide	All	Boiling	22	14
Monethanolamine	All	Boiling	22	14
Sodium hydroxide	67%	Boiling	21	15
Sodium hydroxide	67.80%	275°F	21	15
Tetramine C	All	Boiling	21	8*
SALT SOLUTIONS				
Ammonium thiocyanate	All	Boiling	22	x
Arsenic trichloride	100%	230°F	22	14
Cupric chloride	All	Boiling	22	14
Ferric chloride	All	Boiling	21	14
Ferrous chloride	All	Boiling	22	14
Ferrous sulphate	All	Boiling	22	14
Manganous sulphate	All	Boiling	22	14
Nickel chloride	100%	Boiling	22	14
Nickel sulphate	All	Boiling	22	14
Phosphorus trichloride	25%	Boiling	22	14
Sodium chlorate	All	Boiling	22	14
Sodium hypochlorite	All	Boiling	22	14
Stannic chloride	All	Boiling	22	14
Zinc ammonium chloride	27%	Boiling	22	14
Zinc chloride				
Zinc sulfate				
HALOGENS, AIR, WATER				
Air	—	340°F	22	14
Bromine	100%	—	x	x
Bromine water	Saturated	Room	22	14
Chlorine—dry	100%	Room	21	14
Chlorine water	Saturated	—	x	x
Iodine	100%	—	x	x
Fluorine	100%			
HALOGENS, AIR, WATER cont.				
Steam	100%	340°F	22	14
Water	100%	Boiling	22	14
ORGANIC COMPOUNDS				
Acetone	100%	Boiling	22	14
Amyl alcohol	100%	Boiling	22	14
Aniline	100%	Boiling	22	14
Benzene	100%	Boiling	22	14
Butyl alcohol	100%	Boiling	22	14
Butyl "Cellosolve"	100%	Boiling	21	8*
Carbon tetrachloride	100%	257°F	22	14
"Cellosolve"	100%	Boiling	22	14
Chlorethylbenzene	100%	340°F	22	14
Chloroform	100%	Boiling	22	14
Dowtherm	95%	Boiling	22	14
Dioxan	100%	Boiling	22	14
Ethyl alcohol	Saturated	Room	22	14
Ethylene dichloride	100%	Boiling	21	14
Ethyl mercaptan-water	100%	340°F	22	14
Freon 11 and 12	100%	257°F	22	14
Gasoline	85%	Boiling	22	14
Glycerine	100%	Boiling	22	14
Hydrazine hydrate	100%	Boiling	22	14
Isopropyl acetate	100%	Boiling	22	14
Isopropyl alcohol	100%	Boiling	22	14
Isopropyl ether	All	Boiling	22	14
Kerosene	100%	Boiling	22	14
Mannitol	100%	Boiling	22	8*
Methyl isobutyl ketone	100%	Boiling	22	14
Methyl alcohol	100%	Boiling	22	14
Monochlor benzene	100%	Boiling	22	14
Octyl alcohol	100%	Boiling	22	14
Paradichlorbenzene	100%	Boiling		
Paraldehyde	100%			
Tetrachlorethane, sym.		Room	21	14
Trichlorethylene				
MIXTURES				
Ammonium persulfate plus sulfuric acid	25%	Boiling	22	8*
Chlorinated ethyl alcohols	20%	Boiling	x	x
Chrome plating salts, Hydrochloric acid	All	Boiling	22	14
saturated with chlorine	All	Boiling	21	14
Levulinic acid plus angelica lactone	20%	—		
Nickel plating salts, (chloride)	—	Boiling	22	14
Nickel plating salts, (sulfate)	All	Boiling	22	14
Nitric acid plus hydrofluoric acid	All	200°F	21	(1)
Parkerizing solution	15%	Boiling	22	14
Bayon Spin bath	5%	Boiling		
Sodium hypochlorite plus sodium hydroxide	All	Boiling	21	8
Sulfurous acid saturated with sulfur dioxide	25%	Room	22	14
Thionyl chloride plus hydrochloric acid	—	Boiling	x	x
Sulfuric acid plus nitric acid	—	Room	x	x
	96% .03%			

NOTES: (1) "National" No. 14 Cement used with threaded joints will give serviceable life of at least six months.

* For field assembly "National" No. 15 cement is recommended.
x Not recommended.

"National" carbon, graphite and "Karbate" impervious graphite are ideal for the construction of complete systems for the manufacture or handling of corrosive fluids. These products are both alkali-resistant and acid-resistant... immune to thermal shock ...strong, light in weight ...easily machined and lubricated. Graphite and "Karbate" impervious graphite have higher heat-conductivity than most commonly used corrosion-resistant materials. The following table gives complete information on the corrosion-resistance of "Karbate" materials.

and what to do about it

Install carbon, graphite and "Karbate" impervious graphite equipment for storage, conveying, and processing of corrosive fluids

HEAT EXCHANGERS—

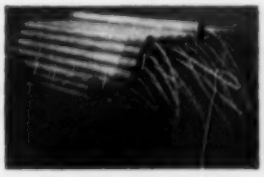
"Karbate" impervious graphite heat exchanger types include: shell and tube, cascade, plate, bayonet and concentric. Available in standard sizes or tailored to your specifications. Provide excellent heat transfer. Resist acids and alkalis, immune to thermal shock, stand strain and vibration, light in weight, easy to install. Write for Catalog Section *M-8808-A*, describing Shell and Tube types; *M-8804* and *M-8809*, describing Plate type and Bayonet type; and *M-8807-C*, describing the Cascade type.

BRICK AND BLOCKS—

"National" carbon and graphite brick and blocks come in a complete range of sizes and shapes for such jobs as linings for stainless steel pickling tanks, sulphate digesters, caustic scrubbing towers, starch hydrolysis equipment, *phosphorus combustion chambers, phosphoric acid hydrators, sulphuric acid concentrators.* Brick and blocks also used for blast furnace and runout trough linings, where resistance to extreme heat and corrosion must be combined. All shapes are strong, immune to thermal shock, hold their shape at extremely high temperatures, are light in weight and easy to install. Write for Catalog Section *M-8300-A* for complete brick information.

PIPE AND FITTINGS—

"Karbate" impervious graphite pipe and fittings in a complete size range include: elbows, crosses, couplings, caps, tees, plugs, nozzles, flanges, blind discs, collars, slotted couplers, flexible couplings. Advantages: top corrosion resistance, immune to thermal shock, light weight, free from corrosion scale, good machinability, strong and not subject to fatigue. Write for Catalog Section *M-8800B* for ordering details on sizes, dimensions, grades. Catalog Section *M-8801-A*, the Installation Manual, tells you how to cut, serrate, cement, thread and support "Karbate" pipe. Also Catalog Sections *M-9100-A* on "Karbate" pumps and *M-8803A* on globe valves.

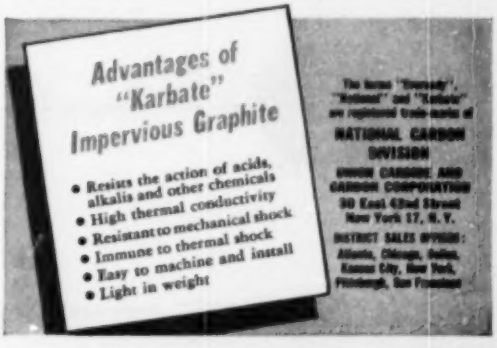


GROUND ANODES—

"National" Graphite, Na graphite and carbon ground anodes, used in connection with "National" BF-2 backfill material, will greatly increase the life of any buried metallic structure subject to soil and stray current corrosion. These anodes have been in service since 1924 and are tried and proved. Anodes are used to protect pipe lines, oil well casings, water mains, gas mains, refinery equipment, tank farms, underground cables, hot water tanks, chemical tanks, underwater structures, power plant equipment, barges, cooling tanks and coils, structural footings and many other similar items. Write for Catalog Sections *M-8500-A.*

TOWERS AND MISC. EQUIPMENT—

Towers made of "Karbate" impervious graphite provide low maintenance and long service life in absorption, fractionation, extraction, scrubbing and related processes. High structural strength, excellent resistance to corrosion and thermal shock, light weight. Bubble caps, trays and distributors made of carbon, graphite or "Karbate" impervious graphite for use in towers. *Carbon Raschig* rings for tower packing in a wide range of sizes. Write for Catalog Sections *M-9600* and *M-9601-A* for information on HCl absorbers; *M-9000-A* for Raschig rings.


Advantages of
"Karbate"
Impervious Graphite
• Resists the action of acids, alkalis and other chemicals
• High thermal conductivity
• Resistant to mechanical shock
• Immune to thermal shock
• Easy to machine and install
• Light in weight
The terms "Trumarb", "National" and "Karbate" are registered trade-marks of
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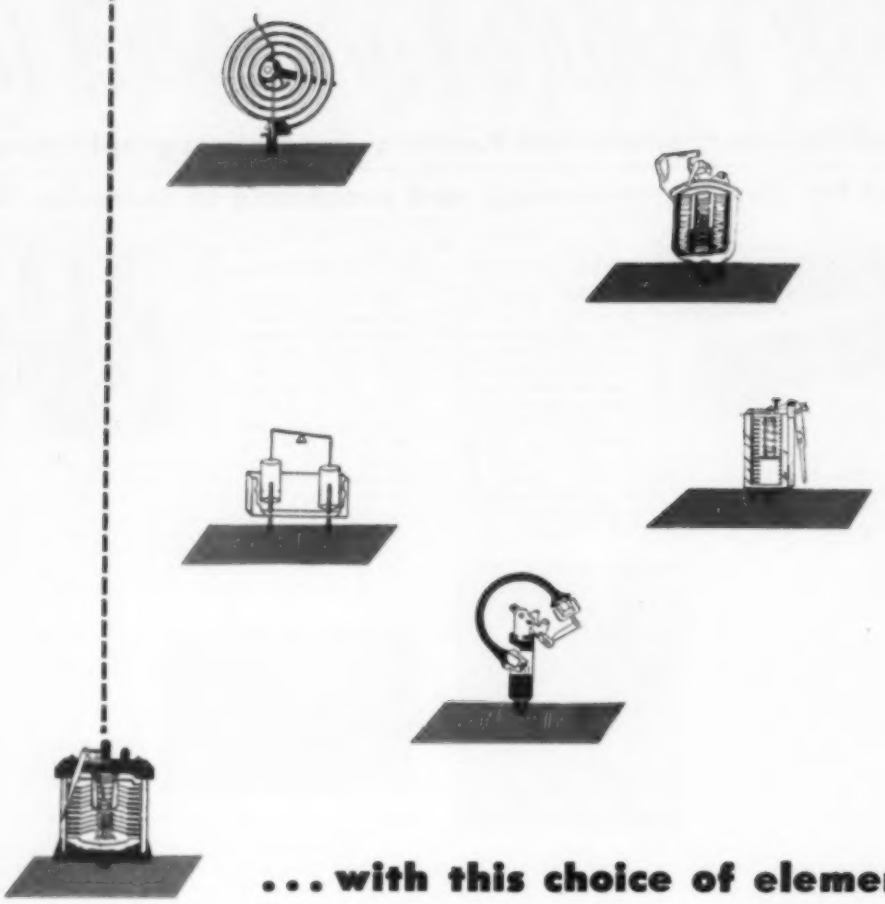

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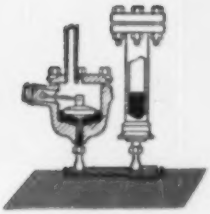
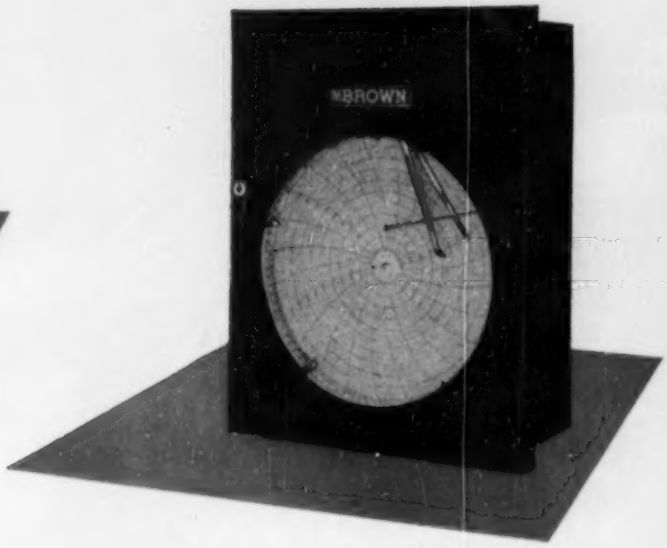
THE PRESSURE GAUGE





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Its performance is the result of engineered design, rugged construction and simplicity of operation. The wide range of measuring elements is responsible for its sensitivity. There's a specific element for every pressure application... from microns to tons ... from corrosive to non-corrosive.

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Honeywell — *Advanced Instrumentation* FOR THE CHEMICAL INDUSTRY — BROWN

EVEN THE best chemical engineers are frequently at a loss when it comes to choosing a protective lining. A material effective at 70°F may fail at 125°F; a material resistant to 5% acid may be attacked by 10%; a material proven adequate in laboratory tests may fail completely in the field.

That's why more and more engineers are saying — "Let's put the problem up to U. S. Stoneware." They have learned that U. S. Stoneware "engineered protection" is a safeguard against excessive down-time . . . against excessive maintenance costs.

There is nothing complicated about "engineered protection." It works like this: Send us your sketches or prints, tell us what solutions you plan to use, their concentration, what impurities are developed, operating temperatures, and margin of safety required.

From our background of almost eighty-five years of experience, we'll suggest the material or combination of materials we have found best suited to do the job for you.

You'll find that U. S. Stoneware "engineered protection" pays off in many ways: in greater equipment life, in freedom from contamination losses, in lower maintenance costs . . . and quite frequently, in lower initial cost.

U. S. STONEWARE manufactures a wide range of corrosion-resistant materials, including Tygon and Duralon plastics, natural and synthetic rubber, Resilon, sheet and homogeneous lead, chemical porcelain, chemical stoneware, acid-brick and cements for corrosion-resistant masonry construction, as well as baked-on coatings of the phenolic type and air-dry coatings. We can thus recommend without prejudice the material, or combination of materials that will do the best job for you.

●

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COMMENTS ON THE NEWS OF CHEMICAL ENGINEERING IN INDUSTRY

Prepared under the editorial direction of Joseph A. O'Connor, News Editor

Commercial synthesis of vitamin A

Synthetic vitamin A, high in potency and free of the fishy taste characteristic of that obtained from fish liver oil, is now in volume production at the Nutley, N. J., plant of Hoffmann-La Roche. Already, Hoffmann-La Roche has cut the price to 30c. per million units.

The 12-step Hoffmann-La Roche synthesis employs most of the unit processes in the book, together with a few modifications that are not. Starting raw material is citral, which comes from lemon grass, most of it from India.

Merck and Pfizer are slated to join Hoffmann-La Roche in the production of synthetic vitamin A before this year is out. Also making the synthetic vitamin, but by a different process, is Distillation Products.

Advent of synthetic vitamin A is going to hit the processors who get vitamin A from fish liver oil. Borden may have to give up its fishing fleet; Van Camp, to cut back its Terminal Island, Calif., operations. The new synthesis also packs a wallop for the fishing fleets of the Scandinavian countries and Japan, for hitherto the livers of cod, halibut and shark brought fat premiums.

Prime market for the new synthetic is in pharmaceuticals, which account for 60 to 70 trillion USP units a year of the total annual market of 100 trillion to 130 trillion units. But synthetic vitamin A will soon invade the foodstuffs market. And whether the market in feeds will be left to the processors of fish liver oil is a question for time and economics to answer.

New way to make heavy water

CHEAP HEAVY WATER—AEC contemplates construction of a plant to produce heavy water by a new process that slashes its cost. At the present cost of heavy water, the proposed plant, which has nothing to do with the hydrogen bomb project, would pay for itself in one year's operation by the savings it would introduce into production of heavy water. New cost of heavy water would be only one-fifth of the old cost. With heavy water cheaper, AEC could use more of it chemically in its reactor program.

HOW IT'S MADE—Process to be employed is the low-temperature distillation of extremely large volumes of hydrogen. For this reason the plant will probably be located at a large synthetic fuels or synthetic ammonia plant, where plenty of hydrogen is available as off gas and could be fed into the heavy-water plant.

COST—Total estimated cost of this project is $5 million, based on a preliminary survey by Hydrocarbon Research, Inc.; $500,000 is being requested for fiscal 1950 and the balance of $4.5 million will be requested in an amendment to the 1951 budget.

EQUIPMENT—Principal items of equipment are: large reciprocating compressors; hydrogen gas turbines to provide refrigeration; reversing heat exchangers; a large primary distillation aluminum tower; and a smaller secondary tower. Welded aluminum piping is to be used throughout.

SITE—No final selection of a plant site has yet been made, but surveys are presently under way.

There are about 20 synthetic ammonia plants in the U. S. The Army still has three, those at West Henderson, Ky., San Jacinto, Tex., and Morgantown, W. Va. And TVA runs the Wilson Dam, Ala., plant. The Morgantown plant, one of the largest in the country, can turn out 18,700 tons of ammonia a month. What does an ammonia plant cost? Well, the Army's Henderson plant can produce 6,000 tons a month, and it cost $15 million.

Hence these questions: Will AEC put its heavy-water plant down beside an existing ammonia plant, as seems likely? Or will it build a brand new ammonia plant costing many times the estimated $5 million for the heavy-water plant just to have its heavy-water plant where it wants it?

How much for hydrogen bomb plants?

Construction work now in prospect for the hydrogen bomb program amounts to only a fraction of that already built for A-bomb production. The Atomic Energy Commission is enjoined from making any comment on cost of H-bomb facilities. But authoritative Washington sources have indicated that new structures and equipment will not run to more than $200 million. Total cost to date of all AEC installations, including community facilities, comes close to $2 billion.

Many present plants and laboratories can be used

(*Continued*)

for H-bomb production. The Argonne National Laboratory in Du Page County, Ill., for example, already is producing tritium, the triple-weight hydrogen isotope now being used in development of the bomb. If more tritium is needed, production undoubtedly can be expanded at Argonne and other installations, perhaps using different methods. As for the bomb itself—possibly loaded with lithium hydride surrounding an A-bomb core—existing plants could be tooled to assemble the weapon.

It is less than likely that H-bomb facilities will be listed separately in any future budget requests or appropriations for AEC construction. For security reasons, the H-bomb construction figures almost certainly will be blanketed into the over-all appropriations.

Celler's target: process industries

Chemical industries are getting their lumps from the anti-monopoly investigators in Congress. True, the steel industry, whose spokesmen have just put in a few trying days before the senators, is leading the parade of industries to be called on the carpet in a new series of House Judiciary Committee hearings. But after the steel executives, who are to be called this month, have been heard, Congressman Celler plans to dig into newsprint, soap, distilling and chemicals.

In most of these investigations, there is some special angle. In newsprint, for example, there will be a look-see into the prices of the Canadian product—and into why American producers do not undercut Canadian prices to get more business. One of the reasons for this line of inquiry: CIO Newspaper Workers have complained that high-priced newsprint is one of the reasons newspapers go broke, and why there are getting to be fewer and fewer jobs for newspapermen. Any other angles in the newsprint hearing will be purely incidental.

Next in line is probably Du Pont—which is to get another going-over—partly because of the successful way the company fared as the result of President Crawford H. Greenewalt's first appearance.

Soap makers and distillers are far down the line. Whether or not Celler actually gets to them depends on whether Congress gives his group money to carry on after its present funds run out. With President Truman's specific blessing, though, the committee's chance of a new lease on life looks good.

Can FTC look at your books?

Any chemical company that has ever been on the receiving end of a cease-and-desist order from the Federal Trade Commission had better heed the Supreme Court decision in the Morton Salt and International Salt case. That ruling gives FTC full authority to examine a company's books to see whether it is still complying with the FTC's order, even though it may have been handed down years ago.

FTC demanded information on prices and terms of sale that it wanted to determine whether the two companies, together with 16 other salt makers, were complying with an order confirmed by the courts in 1943. Other companies threw in the sponge, giving FTC what it wanted. But Morton and International fought the battle clear to the Supreme Court.

Decision is another boost for FTC, which gained new stature and importance as a result of the Supreme Court's ruling in the Cement Institute case two years ago.

Government to keep synthetic rubber plants?

Disposal of this country's synthetic rubber plants poses quite a problem. More and more, it begins to look as though the present law will be extended, with the government keeping the plants and retaining its present authority to require consumption.

Both House and Senate are security-minded, and committee chairmen in charge of legislation on synthetic rubber are leaders of the security-minded forces.

On the other hand, there is no agreement between government and industry, or among members of the synthetic rubber industry, on a practicable disposal program that would not weaken security as far as synthetic rubber is concerned.

The fact is, no one is terribly unhappy about the present set-up. Many rubber consumers and most small rubber manufacturers would rather have the government keep the synthetic industry than have it turned over to the Big Four. The government program guarantees steady supply at stable prices, with everyone getting an even break.

Many object, as a matter of principle, to the government being in the rubber business in peacetime. But the problems of disposal and government regulation of a private synthetic industry are so great that they make continuance of the present situation the most acceptable compromise at this time.

More crude, fewer chemicals for Europe

Europe's oil buying pattern is shifting: Western Europe plans to spend more dollars on crude oil, less on petroleum products.

That is the forecast of the Organization for European Economic Cooperation in Paris. Dollars spent on petroleum products in 1949-50 will come to $289 million. This will slack off to $228 million a year by 1952.

At the same time dollar crude oil purchases are slated to go up from $164 million in 1949-50 to $184 million a year by 1952.

This shift represents a basic change in Western Europe's buying. Needed from now on are raw mate-

(Continued)

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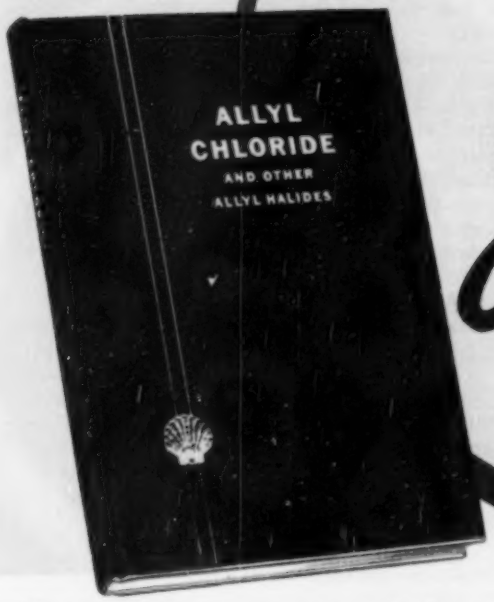

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ALLYL CHLORIDE, the key to Shell's synthetic glycerine production, offers equally important opportunities for syntheses along other lines —resins, dyestuffs and pharmaceuticals, for example.

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rials like crude oil, cotton and copper—to keep industrial capacity running full clip.

Purchases of chemical products are expected to fall off. Basic chemical buying—except for crude sulphur—will decline more gradually. Sulphur purchases are still on the rise.

Western Europe's investment and modernization programs reached their peak this year. Purchases of machinery and other capital goods—including oil refinery equipment—will drop off steadily from now on.

Jamaica ore to augment U. S. bauxite

In a Marshall Plan undertaking, in which the British and Jamaican governments are cooperating, Reynolds Metals will develop vast bauxite deposits in Jamaica for use in the United States. The deposits, first discovered in 1942 by Sir Alfred D'Costa on his 4,000-acre cattle ranch in Jamaica, contain about 50 percent alumina. More important, their silica content is unusually low, ranging from 0.5 to 2.5 percent. Use of low-silica Jamaica ore to supplement the high-silica Arkansas bauxite not only will extend the useful life of the Hurricane Creek alumina plant in Arkansas by many years but also will permit use of lower grades of Arkansas bauxite, thus correspondingly eking out the effective U. S. reserve. Because of its location, the Jamaica bauxite will be of vital strategic importance to the U. S.

Cost of the big mining project will be about $14.5 million. To finance it, Reynolds Jamaica Mines, Ltd., newly formed corporation in which Reynolds Metals will hold $1.5 million of stock, will get an advance of approximately $11 million from ECA. Up to $5,963,000 of this advance will be in U. S. currency and $5,040,000 in British pounds. ECA will be repaid over a 20-year period by delivery of aluminum metal to the Munitions Board stockpile. In addition, the U. S. government gets an option to purchase up to $6 million worth of aluminum at market prices.

The Jamaica project calls for construction of a pier and harbor facilities, a drying plant at the source of the ore deposits, an overhead tramway from the drying plant to the sea, mining equipment and auxiliary facilities. It will take nearly two years to complete.

More than $1 million has already been spent by Reynolds Metals in exploration, drilling and research to insure the usability of the Jamaica bauxite. To provide unloading facilities at a Gulf Coast port and other facilities for handling the Jamaica bauxite at the Hurricane Creek alumina plant in Arkansas, Reynolds will shell out an added $1 million.

Reynolds is purchasing from the General Service Administration four plants, including the alumina plant at Hurricane Creek and a reduction plant at Jones Mill. Since 1946 Reynolds has operated these plants under lease, with an option to buy.

U. S. reserves of low-silica bauxite, according to a Bureau of Mines estimate made at the end of 1947, aggregate only 4 million tons. At the consumption rate during the peak war year of 1943 this is less than one year's requirements for the expanded aluminum industry of the United States. Arkansas has substantial high-silica bauxite deposits in addition to the low-silica bauxite. The Jamaica reserves are estimated to be many times as large as the total known reserves of both high and low grade bauxite in the United States.

Most bauxite used in this country by companies other than Reynolds today is imported from Dutch Guiana, 2,500 miles away. Jamaica is only 1,000 miles from Gulf ports in the U. S. Big savings in transportation of the ore are anticipated, particularly since the Jamaica bauxite can be loaded directly into large ocean-going ships without the trans-shipment required in Dutch Guiana. It is estimated that shipments from Jamaica will require about 40 percent of the cargo capacity needed for the South American ore.

Reynolds will construct a 12,500-ton self-loading ore carrier. This ship will discharge its cargo in 8 hours. It takes an ordinary freighter three days.

During World War II, bauxite had to be imported from Dutch Guiana and British Guiana to meet a critical scarcity in this country. The ocean vessels into which the Guiana ore was trans-shipped at Trinidad were easy prey for submarines. More than 100 bauxite ships, in addition to the convoying vessels, were torpedoed in the Caribbean during 1942 and 1943.

Timetable for minimum wage boosts

Minimum wages are being raised, not only under the Wage-Hour Law, but also for work done on government contracts of $10,000 or more.

FIRST increase affecting the chemical process industries is the 95-c. hourly rate in the soap industry just fixed by Secretary of Labor Maurice J. Tobin to replace the 40-c. rate in force since 1939. Tobin's authority for doing this is contained in the Walsh-Healey Public Contracts Act, which permits the Labor Secretary to fix the minimum wage on government work at the "prevailing minimum wage" in the industry.

NEXT in line for a higher minimum rate is the chemical products industry. Present base is 40 c. in the Southeast and 50 c. in other parts of the country. The new figure may be close to, but probably higher than, the 95-c. rate fixed for the soap manufacturers.

Oddly enough, surveys of the Bureau of Labor Statistics for each industry disclosed that the same average hourly wage—$1.51 an hr.—was being paid.

The chemical industry, however, proposed a new minimum level of 85 c. to 95 c. an hr., while the unions urged a floor of more than $1.25. Tobin is almost certain to go above the industry's offer to a figure above

(*Continued*)

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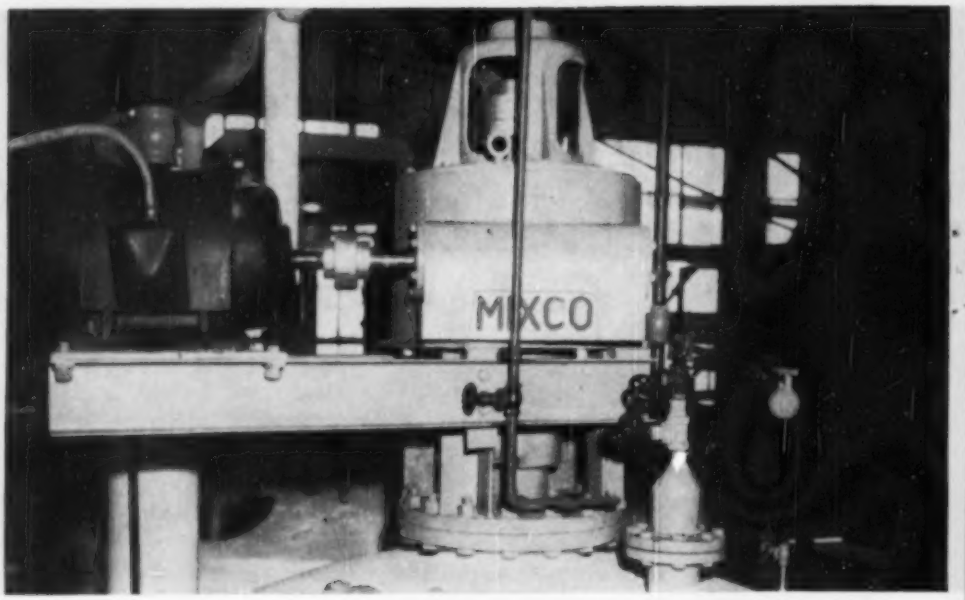

The 15 HP Lightnin Agitator was delivered completely assembled, ready to mount on tank and operate. It can easily be adapted to other tanks, should process requirements change.

APPLICATION DATA:

PROBLEM:
To heat a 15,000 lb. batch of Oil from 100°F. to 300°F. in 25 minutes. Following reaction, to cool from 350°F. to 150°F. in 55 minutes. 150 PSIG steam available for heating. Cooling water temperature 80°F.

COMPONENT	PERCENTAGE BY WT.	SP. GR.	VIS., CP.	TEMP., °F.	SPECIFIC HEAT
Oil	99.85	0.92	45 3 –	100 300 –	0.44
Nickel Catalyst 0.15 (Finely Divided)		–			

TANK:
DIAMETER: 0" STRAIGHT SIDE: 12'4" BOTTOM: dish TOP: dish
MATERIAL: 304 Stainless CAPACITY: 2700 Gal. BATCH RATIO: 0.72

MIXCO ANALYSIS: Conditions stated show a heat transfer requirement of 1,320,000 BTU in 25 minutes with a log-mean temperature difference of 142°F. Based on research work, we find that for optimum conditions an overall heat transfer coefficient during the heating cycle of 150 to 180 BTU/HR. (Sq. Ft.) (°F.), will be obtained. Surface requirements on the basis of the lower figure will be 290 lineal feet of 2" diameter tubing, when arranged according to the MIXCO system of vertical tube-baffles. Optimum suspension and proper power consumption will result by using 8 banks of 3 vertical tubes on 6" centers. A similar analysis of the cooling cycle indicated that a time of 53 minutes would be obtainable.

EQUIPMENT REQUIRED: 15 H.P. LIGHTNIN Closed Tank Top Entering Unit (Model 3B-WC-1500), having an output speed of 90 RPM was selected. In order to obtain maximum AVERAGE velocity in all parts of the tank, 3 flat blade turbine impellers were used. The lower turbine was positioned 18" off bottom and the upper turbines spaced 48" apart. MIXCO's exclusive data showing the effect of viscosity, specific gravity, proximity, pumping capacity, effect of rotational speed on power consumption and other factors, indicated the use of 3—28" diameter multi-bladed turbine impellers. Critical shaft speed data on long over-hung shafts assured safe operation without steady bearing.

RESULTS CHECKED: An overall coefficient of 160 BTU/HR (Sq. Ft.) (°F.) was obtained on this unit, verifying original calculations. The higher rate of heat transfer and absence of time lag in this system made it possible for this user to control the processing temperature within closer limits, yielding a high quality product.

A COMPLETE LINE . . . PLUS UNEXCELLED MIXING TECHNOLOGY

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World's largest selling line of portable mixers. Electric or air motor; direct or gear drive. Capacities ⅛ to 3 H.P. Send for Catalog B-75.

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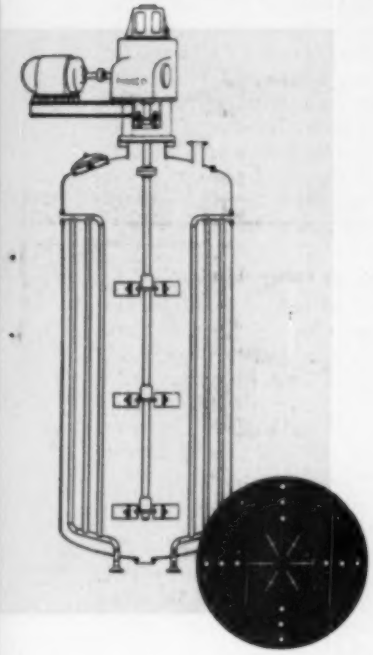
Turbine, propeller or paddle type. For open or closed tanks. Fixed or variable output speeds, heavy duty drive, ¼ to 100 H.P. For details, send for Catalogs B-89, B-78.

SIDE ENTERING MIXERS
For tanks up to 5 million gallons capacity. Gear motor drive, Vee-Belt drive and motorless types. 1 to 25 H.P. For complete information, send for Catalog B-76.

TRANSFER TIME 35%



Close Temperature Control Yields a Higher Quality Product in Typical Problem Solved by MIXCO Engineered Agitation

When this plant replaced its agitation equipment with a modern LIGHTNIN Turbine Agitator, total heating and cooling time was reduced from 120 minutes to 78 minutes. The 35% saving yields a bonus of more than one extra batch for every three processed. Higher heat transfer rates permit closer temperature control and give a product of uniform high quality.

Results like these are the rule, not the exception, in hundreds of plants where LIGHTNIN and MIXCO Mixers are in service. "Process Adapted Agitation" is paying off —in higher production, improved quality and reduced installation and operating costs.

Mixco Engineers study your problem, and by using their exclusive data are able to predict process results. In every case Mixco accepts complete responsibility for the success of the installation.

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They can probably be handled faster —better—cheaper, by MIXCO PROCESS ADAPTED AGITATION:

- Blending
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- ☐ B-78 Top Entering Mixers (Propeller Type)
- ☐ DH-50 Laboratory Mixers
- ☐ B-89 Top Entering Mixers (Turbine & Paddle Type)
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$1 an hr. but not nearly as high as the unions want.

MEANTIME, Tobin has issued a blanket interim order bringing all Walsh-Healey minimum rates up to the new 75-c. wage fixed in the Wage-Hour Law for employers in interstate commerce.

Striking potash miners defeated

The left-wing CIO Mine, Mill & Smelter Workers suffered a bitter and total defeat in the 74-day strike at the Carlsbad, N. M., potash mines.

The union abandoned the strike on January 31, after it became obvious that a back-to-work movement begun two weeks earlier (see *Chementator*, Feb. 1950, p. 70) would be successful in breaking the strike.

Local 415 had called its 1,600 potash workers out on strike November 19 over a rejected demand for a 25-c. hourly wage increase. More than 300 strikers had returned to work and 400 replacements had been hired before the strike ended without a single concession to the union.

Instead, the three companies involved—Potash Co. of America, U. S. Potash Co. and International Minerals & Chemical Corp.—signed a new agreement with the union that protects in their jobs all of the replacements and those employees who had returned to their jobs before the strike terminated. Other strikers were taken back on the basis of seniority. About 400 left without jobs because of the replacements were put on a priority list for rehiring when jobs become available.

Rufus Poole, attorney for the companies, considers it important that the companies also were able to impose two "working rules" as protection against threats by Orville Larson, international vice president of the Mine, Mill & Smelters, that the union would "get revenge." These rules are that there will be no discrimination against any employee by either side because of his part in the strike and that any employee engaging in an organized slowdown or sitdown, or provoking a disturbance, will face discharge.

The contract runs until May 31, when the old contract would have expired if the companies had not cancelled it because of the strike.

Oak Ridge organizers outmaneuvered

NICE TRY—Union activity still thrives at Oak Ridge. The K-25 gaseous diffusion plant and the Y-12 research and development plant producing isotopes, both operated for AEC by Carbide & Carbon, recently were subjected unsuccessfully to organizing attempts by several AFL craft unions and the independent International Association of Machinists.

NO CRAFT UNIONS—At the K-25 plant, the IAM and the AFL electricians, carpenters and boilermakers tried to pick off some of the crafts that cover all production and maintenance employees. Both the CIO and Carbide opposed this split-up and were supported by the National Labor Relations Board. NLRB denied elections requested by the craft unions.

NO UNIONS AT ALL—At the Y-12 plant there is no union, the employees having voted against one in 1946. But elections were sought by the CIO union for all hourly-paid workers and by the AFL electricians, carpenters and machinists for workers in their crafts. Again NLRB refused elections. It turned down the craft unions because it considered the bargaining units inappropriate and rejected the CIO's petition because it did not show enough strength in the plant—at least 30 percent membership—to warrant an election.

RFC loan speeds work on ammonia plant

Construction of the $8 million anhydrous ammonia plant of Mississippi Chemical Corp. at Yazoo City will be speeded now that RFC has approved a $3,349,000 loan, according to Owen Cooper, executive vice president.

With $4,250,000 in cash and securities already on hand, the corporation has only $500,000 still to raise. Stock is owned by about 9,000 farmers, principally in Mississippi and Alabama, with a few in Louisiana and other southern states.

The plant, which Girdler designed and is constructing, is slated to be running by January 1951. Output will be about 120 tons a day of anhydrous ammonia, of which 50 tons will be converted into 140 tons of ammonium nitrate.

Big venture in petrochemicals

Plans are gradually unfolding for the $15 million petrochemicals plant at Corpus Christi, Tex., to be jointly owned by Chicago Corp. and Pontiac Refining Corp.

Wyatt C. Hedrick Engineering Corp., Houston, is general contractor and also has a financial stake in the organization. Sub-contracts will be let for engineering, design and fabrication of the processing units. G. M. McGranahan, president of the engineering firm, was formerly vice president in charge of the Winnie, Tex., plant of McCarthy Chemical Co. Prior to that time, McGranahan had been assistant manager of Dow's Freeport, Tex., plant.

Sale of the 60 million pounds a year of ethylene glycol, 10 million pounds of ethylene oxide, and of the other chemicals to come from the plant will be handled by U. S. Industrial Chemicals. Plans call for manufacture of ammonia, ammonium sulphate, butyl alcohol, butadiene, ethylene dichloride, polyethylene and an octane blending agent, as well as 5,000 bbl. of gasoline a day.

The plant, the former Great Southern refinery, purchased from the federal government and operated by Pontiac, is adjacent to Pontiac's own refinery and Southern Alkali's chlorine-caustic plant. —*End*

Among many stainless applications that are finding wide acceptance in the processing field are beaters, blenders, tanks, tubing, vats, evaporators. Crucible's experience in this field puts stainless to work in your equipment more effectively.

Technical and business papers are full of articles pointing out new uses for stainless steels. The many friends of stainless are apt to overindulge in its praise . . . no matter what the application might be.

Crucible, a pioneer in the development of this specialty steel, is well aware that stainless will live up to its reputation *only* when the right stainless analysis is used. That's why Crucible offers the services of a staff of metallurgists to help you apply stainless to your application.

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hot and cold rolled **STAINLESS SHEET AND STRIP**

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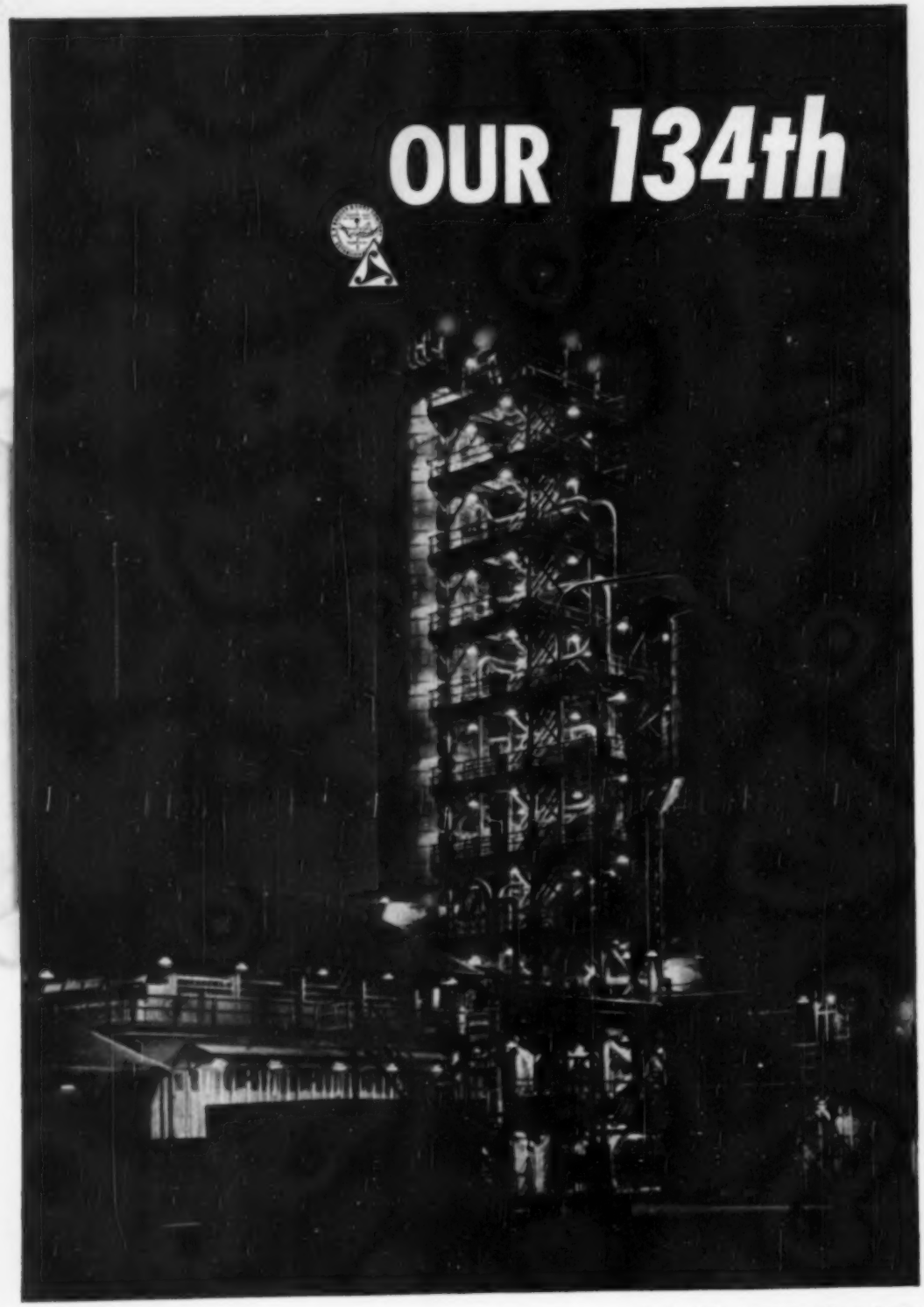
OUR 134th

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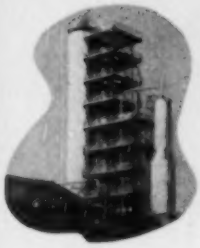

This example of Badger's current work in the Sterling area is the largest post-war refining unit in Europe yet to be completed and brought into successful operation.

Badger's British and American companies together designed, procured and installed this 40,000 BPSD crude distillation unit at the Llandarcy Refinery of National Oil Refineries Ltd., for Anglo-Iranian Oil Company Ltd. Practically all of the materials were of British manufacture.

Here is an example of Badger at work in the international scene. Our British Company is well established and its activities integrated with those of the American parent. Relative dollar and sterling effort and equipment can be proportioned to suit respective currency availability, and this arrangement can be extended to provide for other currencies as well.

The establishment of our British Company twelve years ago, which in itself has executed contracts totaling many tens of millions of dollars, is a further example of Badger service to clients throughout the world.

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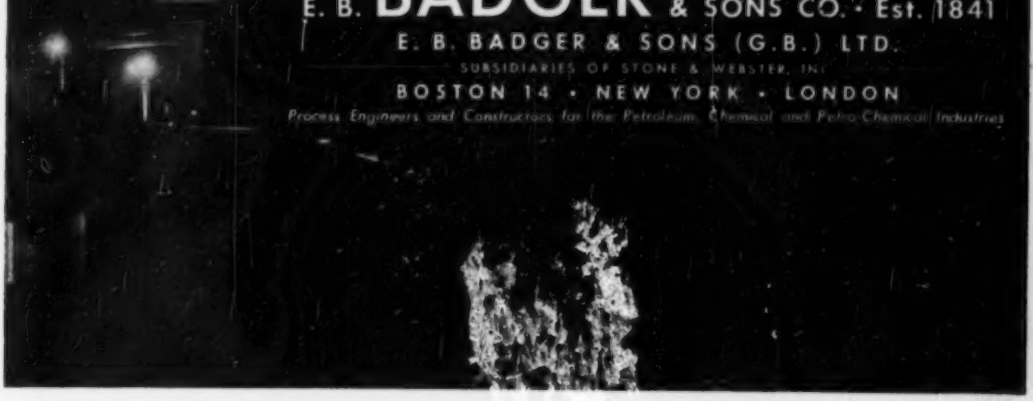

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TOTALLY ENCLOSED FAN COOLED—resists the hazards of abnormal concentrations of dusts, powders, grit, oil mists, acid and alkali fumes.

EXPLOSION PROOF—protects life and property in atmospheres charged with explosive dusts or vapors.

The properly selected protection with the wide variation of starting torque characteristics to choose from provides long operating life and improves the production of the driven equipment.

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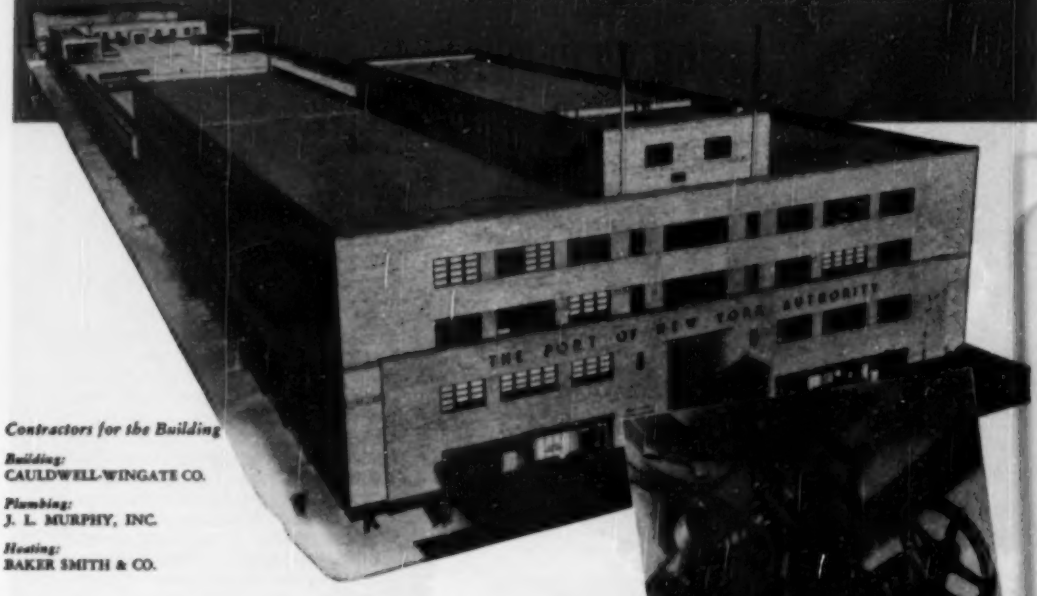

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A CONSOLIDATING TERMINAL for interchange of mixed merchandise freight between over-the-road carriers and local city trucks, the New York Union Motor Truck Terminal was established to reduce shipping costs, and to relieve truck traffic congestions.

All equipment used in the terminal, whether for freight handling or building operation, was selected on the basis of *lowest possible maintenance cost*. That is why Jenkins Valves (over 2800) are installed in water, steam, fire, and other vital pipe lines.

Jenkins builds *extra* endurance into valves —proved time and again by low upkeep cost records in every type of service. Yet, *you pay no more* for Jenkins Valves, despite this extra value. Let the Jenkins Diamond be your guide to valve economy . . . for new installations, for all replacements. *Sold through leading Industrial Distributors everywhere.*

Jenkins Bros., 80 White St., New York 13;
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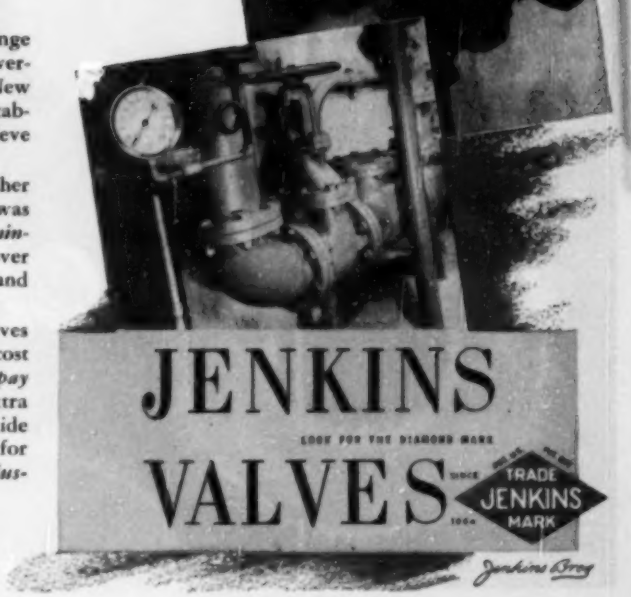

JENKINS

LOOK FOR THE DIAMOND MARK

VALVES

TRADE JENKINS MARK

Jenkins Bros.

Let B&W pour
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into YOUR processing equipment

Products of B&W Engineering for Economy

As vital parts of crushers, grinding mills, pumps, furnaces, tube mills, and many other kinds of process equipment, B&W Alloy Iron and Steel Castings are demonstrating outstanding ability to resist abrasion, corrosion, and oxidation, and to retain high strength even at elevated temperatures. Operating in just about every kind of tough service, they are helping to keep production up by reducing costly, time-consuming repairs and replacements. Their long-life characteristics have been proved over and over in service temperatures up to 2000 F. and under conditions requiring high creep strength and wear-resistance.

Might pay you, as it has so many others, to call on our broad experience in solving processing problems with heat-resistant and wear-resistant alloy castings from our own modern foundries. The Babcock and Wilcox Co., 85 Liberty St., New York 6, N. Y.

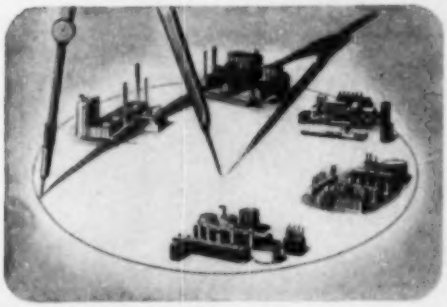
BABCOCK & WILCOX

Look for the hidden "extras"

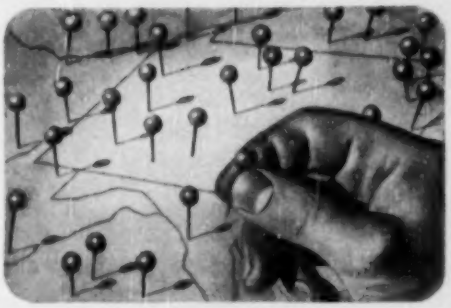
When you specify Solvay in ordering chemicals, you get many advantages that may not be immediately obvious. These hidden "extras" help make your business operate more smoothly, more efficiently . . . and, in many cases, more economically.

1 **TO HELP YOU WORK** out problems—and to offer advice on the proper use, handling and storing of alkalies—there's Solvay "Industry-Wise" Technical Service . . . a corps of skilled technicians with expert knowledge of individual industries, including *your* industry.

2 **SOLVAY'S LONG EXPERIENCE** as America's first alkali manufacturer—totaling almost seven decades—assures you of chemical products *exactly* the way they should be.



3 **SOLVAY'S FIVE HUGE** plants—situated where American industry is centered—guarantees a steady supply of the materials you need.



4 **THE CONVENIENT,** coast-to-coast locations of Solvay's 200 sales offices and warehouses make prompt delivery another feature.

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TRADE MARK REG. U.S. PAT. OFF.

Soda Ash • Caustic Soda • Caustic Potash • Chlorine • Potassium Carbonate • Calcium Chloride • Nytron • Sodium Bicarbonate Specialty Cleansers • Ammonium Bicarbonate • Sodium Nitrite Para-dichlorobenzene • Ortho-dichlorobenzene • Methanol Monochlorobenzene • Ammonium Chloride • Formaldehyde

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All these catalogs of processing equipment manufacturers are instantly available in Section No. 1 of your Sweet's File for the Process Industries.

The other sections of this Sweet's File contain additional scores of catalogs covering a wide range of materials and equipment—useful and up-to-date information on product forms, characteristics, performance and use.

This grouping of manufacturers' catalogs, in sections according to products or use of products, is made for your convenience, so that you can more readily compare one product with another. Indexes of manufacturers, products and trade names lead you quickly and easily to the catalogs you are looking for.

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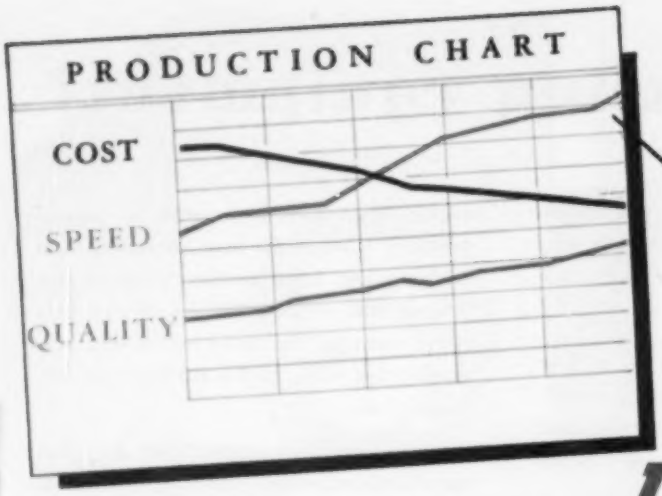

THERE'S WHERE I COME INTO YOUR *PROCESSING* PICTURE!

"I am De Laval Centrifugal Force. When engineers use me to replace slower, obsolete methods of separating two liquids, or of removing solids from a liquid, I make the process of separation or clarification ***continuous***. And continuous flow speeds up operation, saves labor and cuts production costs. Very often I also improve the quality of the product being centrifuged by making a more complete separation.

"I can make separations up to 6000 gallons per hour or more in De Laval "Nozzle-Matic" Separators . . . the capacity depending on the materials being separated. But I can do an equally efficient job in the smallest Laboratory size machine, for efficiency of separation with De Laval machines in no way depends on machine size. ***All*** De Laval machines of a given type do the same job — they vary only in capacity.

"When you write for additional information, it would be helpful if you will outline your problem."

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165 Broadway, New York 6 427 Randolph St., Chicago 6
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FOR PROCESSING SYSTEMS

Among the Many Processes *SPEEDED*

ACID SLUDGE • BLOOD
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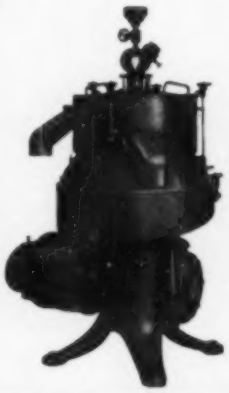

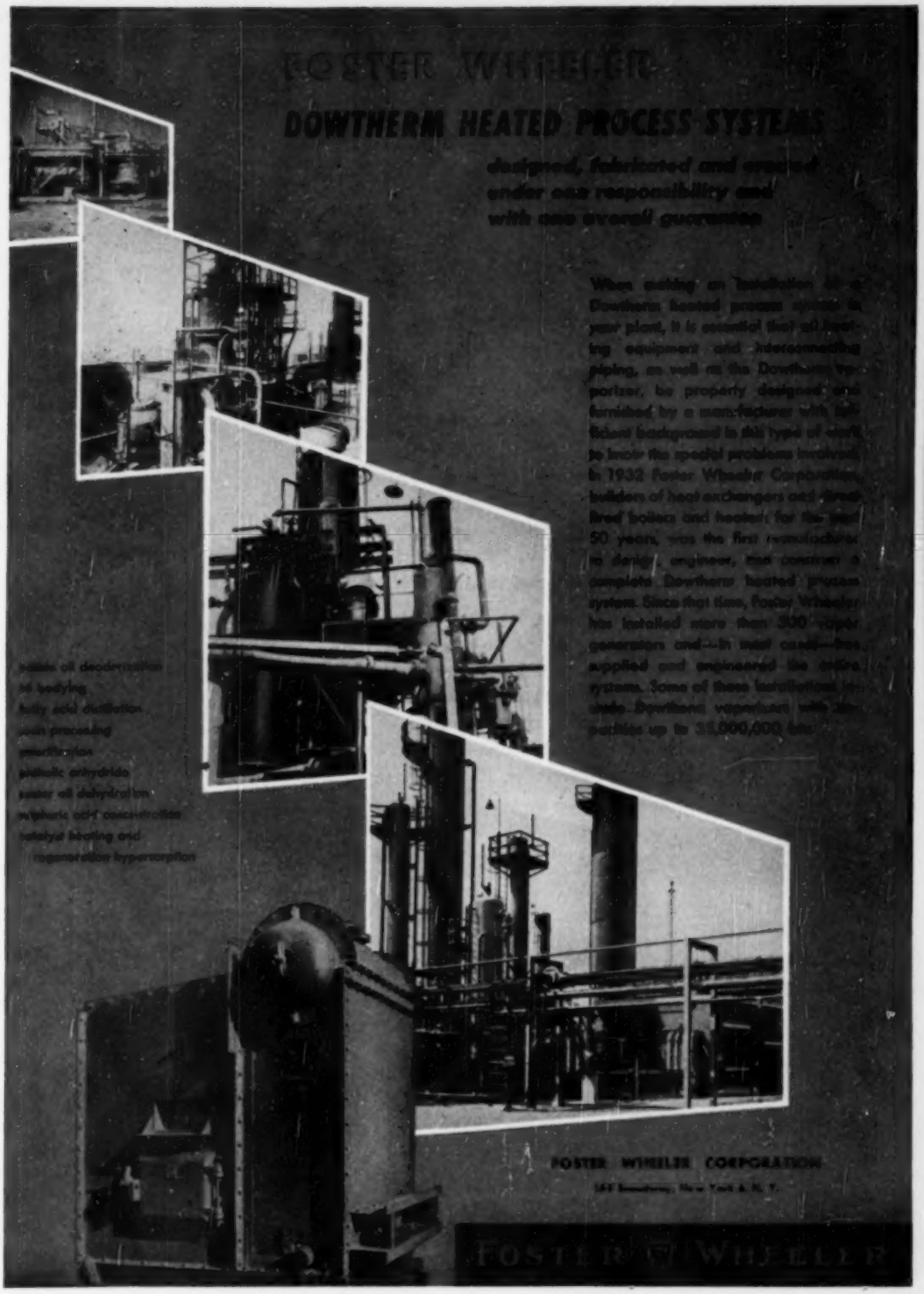
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In 1932 Foster Wheeler Corporation,
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FOR THE *BULK* OF YOUR MATERIAL HANDLING

Payloaders are a proven, successful bulk-material-handling system in hundreds of fertilizer and chemical plants... are handling and rehandling loose materials fast and cheaply. They eliminate many slow, laborious and costly operations ... save time and labor and boost production.

Large pneumatic tires, short wheel bases and multiple speeds in both directions provide traction and maneuverability on or off hard floors, up ramps, through doorways and narrow aisles. It will pay *you* to find out how Payloaders can slash *your* material handling costs. See your Hough Distributor or write The Frank G. Hough Co., 754 Sunnyside Ave., Libertyville, Ill.

Send for catalogs on any size Payloader: the 12 cu. ft. Model HA; the ¾ yd. HF; the 1¼ yd. HL; the 1½ yd. HM. There is no obligation.

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PAYLOADER
Manufactured by THE FRANK G. HOUGH CO.

A SK Fig. 1822 Armored Rotameter protects vital fresh-water supply aboard ship. Built to withstand heavy vibration, pressure and stresses and indicate water flow accurately.

B Rigid process control to insure quality cigarettes is accomplished by two SK Fig. 1891-EL Electronic Recording Rotameters, which measure flow of tobacco casing at cigarette factory.

C SK Fig. 1891 Rotameters measure flow of aromatic aldehydes in a chemical plant.

SK Rotameters are *engineered* to the job—will stand up under rugged service and give you hairline control. Used for measuring or controlling the flow of liquids and gases, these Rotameters are made in the wide variety of types and sizes demanded by today's complex industries.

The examples above give evidence of the way Standard SK Rotameters meet stringent requirements for strength, corrosion resistance and accurate control. Among the many *standard* types of SK Rotameters, made from a variety of materials, you can probably find the meter which fits your problem.

If not, experienced SK engineers can adapt or design a *special* Rotameter that's *job-engineered* to fit. Almost all of our standard Rotameters were designed just that way—to meet customers' unusual requirements for a versatile flow meter.

Put SK's problem-solving ability to work for *you*. Check the standard types of Rotameters available by writing for Bulletin 18-RA. If none of these meet your problem, write us outlining your special requirements.

SCHUTTE and KOERTING Company

Manufacturing Engineers

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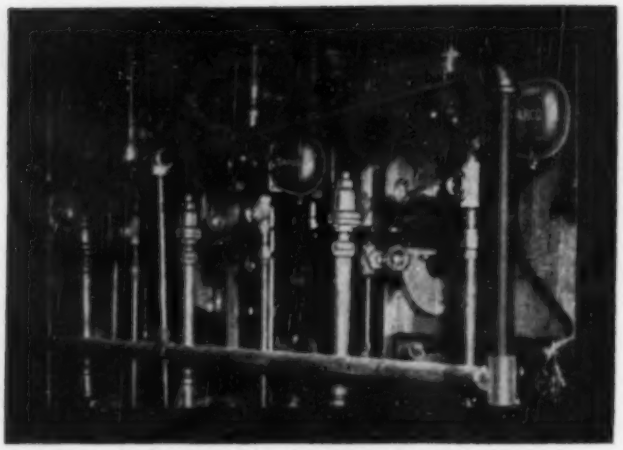
THE *Why* AND *How* OF AIR VENTING



Trapping and venting rotating cylinders of slasher in textile mill

Every steam man knows that air blocks steam lines, but too many executives do not realize what air in the lines and equipment is costing them, and how inexpensive the devices are that can remove it.

There are two vital reasons why air should be removed at the point where it collects.

First—an air steam mixture always has a lower temperature than pure steam at the same pressure. Steam temperature at 15 psi is 249°F, but mixing 50% of air would reduce this to 212°F, equivalent to 0 psi pressure.

Second; and more serious, the air collects on the heated surface and insulates it from the hot steam, reducing output.

THE SOLUTION

First, select the right steam trap. The Sarco No. 9 Thermostatic for instance is wide open when cold. It lets all the initial air out fast. Other Sarcos let air out too, but only at the point where they are installed.

So the next step is to put in Sarco Air Vents at suitable spots in the lines—at the farthest point from entry of steam in process equipment—and at many points in your heating lines.

This is a subject of renewed interest because Sarco has recently designed a complete line of vents and made available special technical data on the subject.

ASK FOR CATALOG No. 275

SARCO

SAVES STEAM

SARCO COMPANY, INC.

Represented in Principal Cities

Empire State Building, New York 1, N.Y.

Memo from the Editors

"How to Get More Gur"

Dozens of foreign chemical journals, published in practically every live language under the sun, come to us. We scan them to keep up with developments, sometimes to answer a request.

Often we are thrown for a loss by some strange language. That happened recently when an article (see above) marked IMPORTANT in red ink was rushed in. The words had an upside-down look, the alphabet didn't click at all. Finally (by a secret process) somebody figured out what it was about: How India can add to its sugar supply by getting more "gur" from Palmyra trees.

"Please Don't"

Every once in a while somebody complains to us that our plant articles don't have enough operating details.

Whether or not you want more of these details depends on what you are using your desk for: to write about your own plant, or to read about somebody else's. Writing must conceal know-how and trade secrets. Reading must satisfy curiosity and instruct. There are two legitimate sides to the question. But they leave us right in the middle. We can't and we don't write up your plant without your permission and approval of copy. We do want to tell our readers as much as we can.

Here are excerpts from a letter. They show why you couldn't read a lot of details that were originally in one of our write-ups:

"Your manuscript has too much detail for us to pass . . . We cannot allow divulging any detailed information on . . . That paragraph will have to be removed . . . We also cut the reference to the method of . . . We prefer not to feature . . . Change reference to xxx lb. to 'a large portion' . . . Substitute 'part of the' in place of 'about x percent'."

And so on. Twenty-seven specific deletions ranging from one word to a full typewritten page. It all wound up with a postscript: "On second thought, we would like to request that you rewrite the lead-off information about . . . We do not intend to obscure the fact that . . . However . . ."

Do you want more details given in our plant description articles?

Ladies Write, Too

"My husband really enjoys your magazine. So I thought I'd take it upon myself to renew it for him. He can count it as a Christmas gift if he likes.

"And do you know why I feel so kindly toward you? His present position with the . . . . company is the result of one of your ads."

Mrs. Chemical Engineer

Proper Dress?

Jay Hedrick, who used to be with Shell Chemical, writes: ". . . . there will be an opportunity here at Cornell for me to start a course in Chemical Engineering Economics to fifth-year and graduate students. My feeling is that its primary purpose should be to acquaint the young chemical engineer with various aspects of the economic climate in which he must later work. Your ideas would be most gratefully received."

We sent Jay four pages of ideas. But what about you engineers in industry? When you left school, decked up in your cap and gown, were you "properly dressed" for the economic climate in which you work? If so, why not tell Jay what kind of clothes were prepared for you? If not, tell him how he might better prepare those young graduates-to-be of his. Write: J. E. Hedrick, School of Chemical and Metallurgical Engineering, Olin Hall, Cornell University, Ithaca, N. Y.

Bits and Pieces

• Married: Associate Editor Roger Williams, Jr., and Miss Anna Marie Given, in New York City, February 11. First time for both. Only hitch: sample issue number three of *The Chementator* prevented a honeymoon. The new Mrs. Williams' only comment: "Damn!"

• Have you often thought how handy it would be to have a list of chemical processing plants and their products? Pacific Coast Editor Jack Hightower has—and has done something about it. He has just finished a directory of the chemical process industries in the 11 Western States. It lists some 1,500 different plants in the West, the location, type of products and operating company at each. Jack's directory, under way for almost two years, is the most complete—and probably the only one—of its kind. You can have one for $1 and the asking.

• "Faraday expressed it very will (he always did) when he described the three necessary stages of useful research—the first to begin it, the second to end it, and the third to publish it."—Sir Robert Robinson.

• Here is one of the Ten Demandments said to have been set forth by one Cyrus Simmons, an old wagon builder: "Don't alibi. If you're worth correcting you're worth keeping. I don't waste time cutting specks out of rotten apples."

• When you turned the front cover of this issue, were you surprised to see that section of unorthodox fractional pages right before you? Our name for the new section—"capsulated contents"—describes its purpose: to give you in one place an easy-to-use but complete index of the contents (editorial and advertising) of each issue of *Chemical Engineering*. How do you like it?

Working Together for Faster Steel Service

Here's the team that swings into action the moment you contact a Ryerson plant. From the phone girl who receives your call to the driver who delivers your order it's a team of specialists who take pride in the job of getting steel to you quickly.

As soon as we take your order, duplicate copies are rushed to every person concerned and scheduling is completed simultaneously for all departments to prevent the slightest delay. In the warehouse, experienced steel men select your requirements from certified quality stocks. Carbon, alloy and stainless steels on hand in most every size, shape and finish make it easy for you to concentrate purchases—save time and develop lower costs. Then flame-cutters flash . . . friction saws roar . . . shears and punches crash. Your steel is prepared to exact specifications and rushed to the shipping floor according to schedule. A waiting truck speeds the steel to your door.

That's Ryerson steel service—a remarkable example of teamwork that enables us to ship steel in any form, to any place, in record time. Whenever you need high quality steel—need it fast—we urge you to call our nearest plant.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled & cold finished

STRUCTURALS—Channels, angles, beams, etc.

PLATES—Sheared & U. M. Inland 4-Way Safety Plate

SHEETS—Hot & cold rolled, many types & coatings

TUBING—Seamless & welded, mechanical & boiler tubes

ALLOYS—Hot rolled, cold finished, heat treated

STAINLESS—Alleghany bars, plates, sheets, tubes, etc.

MACHINERY & TOOLS—For metal fabrication

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

ESTABLISHED 1902 SIDNEY D. KIRKPATRICK, Editor

Chemical Engineering

WITH CHEMICAL & METALLURGICAL ENGINEERING

MARCH 1950

Cold War On Cold Rubber?

We have been impressed, as we presume you have, by the national advertising campaign of the Natural Rubber Bureau of Washington, D. C. A reputed fund of a million dollars is to be used to publicize and promote the use of the British Commonwealth's best dollar-earner in the American market. The first advertisements have appeared in consumer magazines and daily newspapers, thus indicating an obvious desire to influence public opinion in favor of the imported product. To the evident credit of the sponsors, the copy makes no comparisons with or claims for superiority over American-made synthetic rubbers.

But we note with much interest, and some concern, the following statement of policy in the press release that inaugurated the advertising compaign: "What the Natural Rubber Bureau seeks is market expansion, not restriction; fair competition, not 'warfare'; self-help, not subsidy." Here, it seems to us, is an implication that the evident intention of our government to maintain an active synthetic rubber industry in this country is in some way a "restriction," or brake on "market expansion." Certainly that is not the case. And the British producers are indeed poorly informed if they believe that the American industry is going to curtail its efforts to make synthetic rubber better, cheaper and more widely used. Both interests can and should work for an ever broadening market.

The choice between fair competition and "warfare" is pretty largely up to the participants. It will not be favorably influenced by the argument for "self-help, not subsidy." There has been no synthetic rubber subsidy in the United States. That business, we have reason to believe, has been run with far less government financial assistance than is currently furnished to the British rubber producers.

This is not the time or place to discuss fiscal detail, but certain general facts should be recorded. Rubber Reserve has paid interest to the U. S. Treasury on the money invested in the synthetic rubber plants. It has paid local and state taxes on these properties. It has returned to the Treasury the funds realized from the disposal of many of the wartime plants. The remaining money advanced from the Treasury for rubber plants is less than the amount which will be realized as the rest of the plants are sold. In short, the credit of the government has been used but there has been no subsidy.

President Truman has given us a safe framework for a national rubber policy in his recent recommendations to the Congress. National security must and will continue to be our basic objective. This, of course, means that we should never again be dependent solely on foreign sources for such a strategic raw material. But he also recognizes that "it is in the interest of the United States to facilitate the importation of natural rubber on a freely competitive basis to the maximum extent consistent with the need for preserving a domestic synthetic rubber producing industry."

It is scarcely conceivable that American rubber products will soon be made solely from either synthetic or natural rubber. But if the British Rubber Development Board attempts to drive synthetic rubber out of its equally justifiable share of the American market, the cold war suggested by the Bureau's declarations of policy might become very hot indeed. Our rubber consuming industries cannot be as easily intimidated as they were back in the twenties when the Stevenson plan forced natural rubber prices to a peak of several dollars a pound. Nor should it be necessary to remind our friends of the historical outcome of most other battles between natural and synthetic chemical products.

Wax

JAMES A. LEE

PICTURED FLOWSHEET PAGE 170

Cit-Con Oil Corp.'s new plant near Lake Charles, La., is not just another lube oil installation. It contains several features that will be watched with interest by chemical engineers inside and outside of the petroleum refining industry. Cooling tower design is new. A "pig" is used to separate one oil from another in the finished products pipeline. Dry air prevents breathing of product storage tanks. Furfural units are the largest ever constructed and contain some new design. The same is true of the Duo-Sol units. More will be said about each of these and other features as their positions in the flow of materials through the plant are reached in the story that follows:

This company and its $40,000,000 plant is a jointly owned subsidiary of Cities Service Co. and Continental Oil Co. Both parent companies have refineries at Lake Charles. The former's is adjacent to the new lube oil plant. Cit-Con's products include 6,000 bbl. per day of lubricating-oil base stocks and 70,000,000 lb. of fully refined crystalline wax per year. They will be divided between the two companies. Cit-Con will not have a sales organization of its own. Cit-Con's byproducts are sent to the adjacent refinery for use. They include: gas oil; waxy neutral distillate, to be blended into catalytic cracking charge stock; solvent refining extracts, which will be blended with cycle gas oil to fuel specifications; unmarketable wax fractions, also slated for cracking stock; contact clays; and acid sludge, to be processed for acid recovery.

Perhaps the first feature of the lube oil refinery is that it depends upon the adjacent Tuwiler refinery of Cities Service Refining Corp. for its raw material, topped crude from a blend of sweet crudes from Texas, Louisiana and Arkansas.

The process is standard. It consists of several steps: (1) vacuum distillation to produce as tower sidestreams closely fractionated distillate cuts and a bottom residuum stock for solvent refining; (2) furfural solvent refining of the distilled fractions; (3) Duo-Sol solvent refining of the residuum stock to produce bright stock and also

Duo-Sol extraction of heavy stocks is carried out in this unit. It uses propane and a mixture of phenol and cresylic acid. Capacity is 9,700 bbl. per day.

Water cooling is done on a big scale here. This is the largest water tower of its kind. It cools 51,000 gpm. from 117 to 92 deg. F.

Fluid flow to and from one of the twin vacuum distillation units at the Lake Charles unit as handled by this battery of pumps.

JAMES A. LEE is *Southwestern Editor* of Chemical Engineering.

and Lube Oils Shine at Cit-Con

World's largest furfural extraction and Duo-Sol units are only part of the chemical engineering achievements found in this new plant.

of a portion of the heaviest distillate cut; (4) MEK solvent dewaxing of each solvent-refined fraction including simultaneous recrystallization of crystalline waxes to remove oil and soft wax, and MEK repulping of petrolatum to remove excess oil; and finally, (5) clay contacting of the dewaxed oil to improve color and stability. The de-oiled crystalline wax is acid treated and percolated through bauxite clay to improve color and remove odor and taste. Waxes are shipped in slab form and tank cars. The lube oil is shipped in tank cars, barges and tankers.

Reduced crude oil from Cities Service is fractionated into desired cuts for subsequent solvent refining. Fractionation is done in two identical vacuum-distillation units each with a capacity of 12,500 bbl. per day of charge stock. Gas oil with no desirable lubricating oil fractions are condensed in the top of the tower by circulating reflux and withdrawn as a side-draw product. Four cuts are withdrawn at lower stages and passed through strippers. They are reboiled by exchange with tower bottoms to produce high-flash fractions for further refining. Viscosities of these cuts are regulated to produce finished lube oil viscosities of 100, 200, 300-350 and 600-670 SSU (Saybolt universal) at 100 deg. F. Bright stocks made from the residuum stock has a viscosity of 150-160 SSU at 210 deg. F.

VACUUM DISTILLATION

Fractionating columns are equipped with "shower" trays instead of conventional bubble decks except for the top tray and the two trays above the feed inlet which are the conventional type. This design is said to permit a smaller diameter tower and to reduce over-all pressure drop; the latter is especially important when tower products are to be closely fractionated sidestreams. Shower trays give intimate contact between liquid and vapor. Among the other advantages of this tray is a substantially increased vapor velocity possible without danger of flooding. The only drawback to the shower tray design is its somewhat lower efficiency which is counterbalanced by the use of additional trays. An oil separation tank to reduce oil loss from the vacuum system to a minimum is another feature of these fractionating units.

FURFURAL REFINING

Furfural refining is used to remove undesirable constituents from the distillate cuts. Cit-Con's furfural unit is the largest of its kind ever installed and operated. It can circulate as much as 30,000 bbl. per day of solvent and maintain the same oil-charge rate when producing 100-v.i. (viscosity index) oil as when producing 95-v.i. oil, due to extra capacity of the extract recovery equipment. While it is conventional in basic design several improvements have been included: (1) flue gas blanketing of solvent storage tanks; (2) incorporation of charge oil de-aeration under 1.5 psia. pressure to reduce oxygen and consequently minimize deformation of corrosive acids and coke; (3) revisions in the venting system to prevent air intrusion.

In solvent recovery four stages are used on the extract phase. The first vaporization of the extract phase is done at atmospheric pressure in a column, where part of the furfural passes off overhead. The balance of the solvent is recovered from the bottoms by passing to a pressure flash tower, a vacuum flash tower, and a vacuum stripper.

Solvent is more easily recovered from the raffinate. Processing includes heating in a furnace, followed by vacuum flashing and, finally, steam stripping under vacuum.

DUO-SOL REFINING

Solvent refining of the vacuum tower residuum stock in order to make bright stock is done in a Duo-Sol unit. Here propane and Selecto (a blend of 80 percent phenol and 20 percent cresylic acid) are used to dissolve out the undesirable bodies in the oil. This unit does not differ from others in use except in size and improvements in the solvent recovery part of the unit. Among the changes: (1) increase in pressure of the Selecto recovery towers to 70 psi. to supply reboiler heat to the propane recovery section; (2) raffinate and extract stripping towers are operated under vacuum instead of at atmospheric pressure to decrease solvent loss; (3) there is a novel vapor relief system.

Cit-Con's Duo-Sol unit is the largest of its type ever installed. It has a daily capacity of 9,700 bbl. The solvent-treating extractor section has seven extractors. The plant when necessary can handle a portion of the heavy distillate stock in order to balance throughput requirements.

MEK DEWAXING

MEK solvent dewaxing is used for all solvent-refined raffinate stocks to separate wax from oil. The solvent employed is a blend of methyl ethyl ketone, benzene, and toluene. There are two separate units. One dewaxes the three lightest distillate stocks, the second dewaxes the heavy distillate and bright stock fractions.

The first of the units includes, in addition to oil dewaxing equipment, necessary equipment to recrystallize simultaneously wax produced from the dewaxing operation to remove oil and soft wax and thereby turn out wax of the required oil content and melting point. Recrystallization replaces the usual wax-sweating process used for many years. There are four rotary vacuum filters 20 ft. in length and 10 ft. in diameter blanketed with flue gas for use in removing the wax.

Wax is removed by filtering at −15 deg. F., remixed with solvent, heated to 120 deg. F. and rechilled to 25 deg. F. Again refiltered, the "soft" wax and oil go to the filtrate and the product wax is filtered out as a cake.

The MEK unit handles heavy distillate and bright stock. It has six rotary vacuum filters. Processing up to this point is similar to that described for the other unit. However, instead of recrystallizing this plant repulps the primary wax with additional solvent and then refilters at −15 deg. F. for de-oiling to a maximum of 5 percent in making microcrystalline wax. The filtrate is returned to the primary filter charge stream for recovery of the oil.

Color and stability of oils are improved by the contact clay treating process. There are two identical units which include all the latest improvements. One plant handles the light distillates; the other heavy distillates and bright stocks. Each unit can clay treat between 2,800 and 3,600 bbl. of

oil per day depending on the stock.

Clay is added to the oils and the mixture heated to 330 to 530 deg. F. From the contactor oil flows to a precoat filter blanketed with flue gas because of the high temperatures. Filtered oil is vacuum stripped twice for removal of traces of odor, light hydrocarbons, solvents and water. It is passed through a blotter filter which removes traces of clay and then pumped to storage.

Crystalline waxes are treated in the wax finishing plant. They are first treated with sulphuric acid in batch agitators. The remaining acid is neutralized with dilute caustic soda in other agitators, washed with water and dried in a vacuum dehydrator to remove water and traces of odor. The waxes are stored, before final percolation through bauxite, in insulated storage tanks equipped with hot water coils to hold the desired temperature and minimize danger of oxidation.

Percolation is done in 60 ton filters. From these filters the wax discharges to "run tanks" and then to insulated and heated 2,500 bbl. storage tanks. The wax is run to tank cars or to the slabbing building, to be made into 10-lb. slabs.

Special designed storage tanks are used for finished lube oils. These were necessary due to the humid climatic conditions in the area of the plant. If the customary tanks were used moisture would condense inside the tanks and would contaminate finished oils. Partially dried air is blown into the top of the tanks from automatically regenerated activated alumina-type air dryers. The air flows at a rate of 150 cfm. when the oil is being pumped out. The partially dried air prevents "breathing" of the tank and climinates moisture condensation which might cloud the oil. Mechanical agitators in the tanks insure uniformity of the products of the tank.

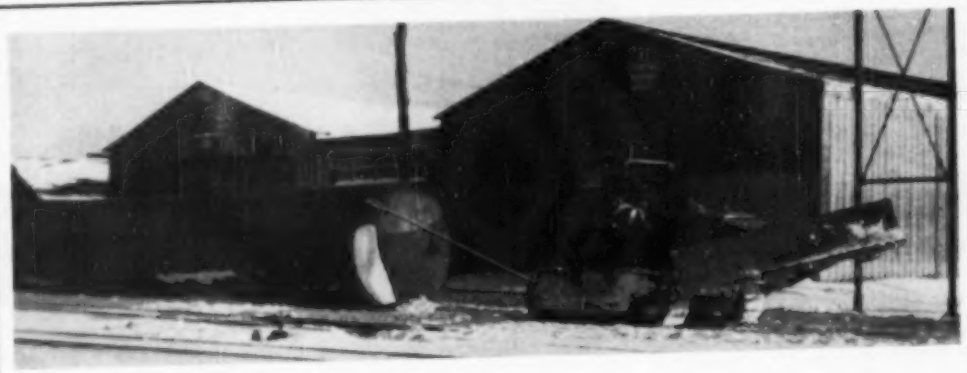
The oil is transferred from these storage tanks to the ships at the docks 2 mi. away through four 8-in. pipelines.

When changing from one grade of oil to another a "pig" is used to separate the two grades. It is a cylinder equipped with two closely fitting neoprene sealing cups on each end. It may be used to clear the line of oil when necessary by pushing it through with air pressure. It is also possible tho undesirable to wash the lines with the grade of oil to be loaded. This must be kept to a minimum to prevent large volumes of off-test oil.

These provisions will make possible maximum protection of oil quality and will insure efficient large volume handling of products meeting close specifications.

The 34-cell multi-stage induced draft cooling tower is one of the most interesting features of this refinery. Each cell is equipped with a fan of 14-ft. dia. It is constructed in two parallel sections. Water enters the center and is distributed over 1-in. cris-cross slats. Water runs down over the first bed of packing. After passing through this bed it is collected and distributed over a second bed. Again it is collected and passed over a third bed. The over-all result is that water comes in contact three times with fresh air. In the humid climate of Lake Charles there should be a closer approach to the wet bulb temperature. This is the first time as large a unit has been constructed. Thus far it has given satisfactory results.

The unit was designed for 87 wet bulb and to cool 51,000 gpm. of water from 117 to 92 deg. F. However the prevailing air temperature in Lake Charles has been below the design temperature since its operation commenced.

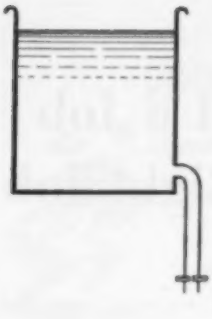


Easiest Way to Move It

The Austin Co., resident engineers and builders for Dow Chemical at Midland, Mich., recently solved a problem of installing four 40-ton, 8 ft. dia. by 70 ft. long, 30,000 gal. capacity gas storage tanks. They were made of ⅜ in. high-tensile, stress-relieved, all-welded steel boiler plate by the Sun Ship Building Co. Three flat-cars were required to transport each tank from Chester, Pa., to the Dow property.

But the problem was to move the cumbersome vessels from the Dow railway siding to the point of installation about ¼ mile distant. Realizing that the coefficient of sliding friction would be reduced from an estimated f of 0.2 for dry ground to f of 0.02 for snow, it was decided to wait for the early snow predicted.

After the snow had fallen, two 25-ton motor-jib-cranes lowered the tank to the ground. Then a D-8 Caterpillar tractor was harnessed to the front of a tank; at the rear a Lorain motor crane pushed. With this power, the tanks were skidded along the snow for the entire distance with ease. Cranes then hoisted the tanks into their concrete reinforced steel saddles.



POT, PIPE & HOLE

Ancient combination—tank and orifice—has possibilities for modern processing. Handy equations make the method easy.

GEORGE T. AUSTIN

It is often desirable to add a reagent to a batch or continuous process at a controlled rate not to exceed a certain maximum value, or to add the reagent needed in a certain fixed time. The use of a combination of tank and orifice is an extremely simple and inexpensive method of controlling rate. The addition of a timing device equipped to ring a bell, flash a signal or shut off the discharge valve the proper time completes the batching system.

If a constant rate of flow through the orifice is desired, a constant head must be maintained upon it. The supply tank should have a float valve, overflow, or some sort of pump-up controller to keep the tank filled to a constant depth. The ordinary equation for orifice flow applies with reasonable precision. If the tank is kept full to the level h and the orifice is a ft. below the tank then

$$V_o = C[2g(h + a)]^{1/2}$$

To apply this equation to the typical case, it is necessary that C be known. C can be evaluated by using the chart below. (From Tuve and Sprenkle, *Instruments*, Nov. 1933, p. 201) to a good first approximation. This figure shows the ratios of orifice-to-pipe diameters which are preferred for design purposes. For values of Reynolds number greater than those shown, a value of C of 0.61 is recommended. For very precise work, the value of the orifice diameter which can be calculated from Eq. (1) is not sufficiently exact, so the orifice so designed should be calibrated by measurement. Even in such a case, the value calculated from Eq. (1) is the logical starting point in the design. For most purposes it is better to express the equation so that it relates rate of flow to orifice diameter directly. If Q' is in gallons per minute and d the orifice diameter in inches

$$d^2 = Q'/19.6C(h + a)^{1/2} \qquad (2)$$

Similarly, the Reynolds number $D_o V_o \rho/\mu$ can be expressed

$$50.6_\rho Q'/d\mu \qquad (3)$$

where ρ is in pounds per cubic foot and μ in centipoises.

When the batching operation is to be done by filling a tank and allowing it to drain through the orifice, the equations are slightly more complicated in form but no more difficult to use. This method operates, of necessity, with a constantly decreasing rate. But by using a tank of large diameter and placing the orifice well below the tank so that the change in the head in the tank (h) is a small percentage of the total head ($h + a$), this change in rate may be made as small as desired. For many processes, this constantly decreasing rate is a distinct advantage since the reaction rate of chemical processes often makes it desirable to add at slower rates as the endpoint is approached. By using deep, small diameter tanks, the rate may be caused to undergo extensive change while adding the reagent. By using more than one orifice, very fast rates followed by slow rates are possible.

Suppose that a tank is to be completely filled at the time when discharge through the orifice is started; then $h = H$. The size of the batch to be added in θ sec. is q cu. ft. At any given instant, the rate of flow through the orifice in cubic feet per second is

$$V_o A = CA[2g(h + a)]^{1/2}$$

The cross-section area of the tank is $\pi D^2/4$ so

$$-dh/d\theta = V_o A/(\pi D^2/4) = 32.08CA(h + a)^{1/2}\pi D^2 \qquad (4)$$

Equation (4) can be readily integrated and used. But the variables which it contains are not as convenient as some others; a change of variables is therefore desirable. Note that $q = (H - h)\,\pi D^2/4$ and so $dq = -(\pi D^2/4)\,dh$ substituting these values in Eq. (44) and collecting terms yields

$$dq/d\theta = 8.02CA(H + a - 4q/\pi D^2)^{1/2}$$

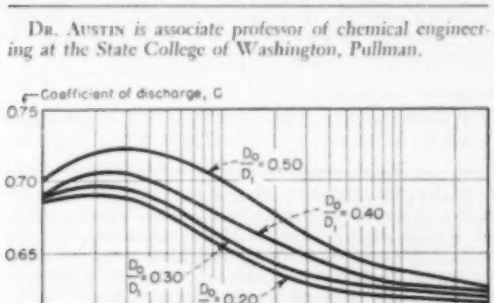
Collecting like terms and integrating

$$\int_0^q \frac{dq}{\sqrt{(H + a) - 4/\pi D^2 q}} = 8.02\,AC \int_0^\theta d\theta$$

which integrates to

$$(H + a)^{1/2} - (H + a - 4/\pi D^2 q)^{1/2} = 5.10CA\theta/D^2 \qquad (5)$$

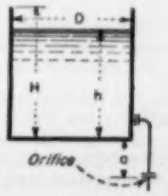
Equation (5) is a working equation relating orifice diameter to time of efflux when the tank size and the



DR. AUSTIN *is associate professor of chemical engineering at the State College of Washington, Pullman.*

NOMENCLATURE

- a = distance from bottom of tank to orifice, ft.
- A = area of orifice opening, sq. ft.
- C = coefficient of discharge of the orifice
- d = diameter of the orifice, in.
- D = diameter of supply tank, ft.
- D_o = diameter of the orifice, ft.
- g = gravitational constant, 32.2 ft. per sec.^{2}
- h = height of the liquid at time θ, ft.
- H = working depth of supply tank, ft.
- q = size of a batch, cu. ft.
- Q = size of a batch, gal.
- Q' = flow of liquid through the orifice, gpm.
- t = time required to add a batch, min.
- V_o = velocity of liquid through the orifice, fps.
- θ = time required to add a batch, sec.
- ρ = density of flowing fluid, lb. per cu. ft.
- μ = viscosity of flowing fluid, centipoises.



orifice location have been decided upon. More common units for Eq. (5) make it easier to use. If Q is the size of the batch in gallons, t the time in minutes and d the orifice diameter in inches, Eq. (5) may be modified to

$$(H + a)^{1/2} - (H + a - 0.17Q/D^2)^{1/2} = 1.670Cd^2t/D^2 \quad (6)$$

Consider a typical example: 60 gal. of 66 Be sulphuric acid at 25 deg. C. is to be added to a processing unit over a 15-min. period. A cylindrical lead tank 2 ft. inside diameter by 6 ft. deep (total capacity of 141 gal., 23.5 gal. per ft.) is available. What size orifice should be used and how should the tank and orifice be installed?

An orifice discharge coefficient between 0.62 and 0.70 may be expected for most common operating conditions (see cut) with values around 0.62 most frequently encountered. To get a rapid solution, assume a value for the discharge coefficient. This value can be checked later after the preliminary design is made. Exact work requires that the orifice be calibrated when in place. Assume a value of 0.62 for C and plan to place the orifice 1 ft. below the bottom of the tank. (This can be changed if the orifice size resulting is unreasonable—increasing the distance will reduce the orifice size.) H is 6 ft., a is 1 ft., Q is 60 gal., D is 2 ft., t is 15 min., C is 0.62 and d is unknown. Substituting into Eq. (6) gives $d = 0.371$.

Before the orifice diameter calculated above can be accepted as final, the assumed coefficient must be checked. A size for the pipe in which the orifice is inserted must be selected and the physical properties of the flowing fluid found in standard handbooks. Choose a 1-in. standard pipe in which to insert the orifice, then $D_s/D^2 = 0.371/1.049 = 0.357$. Perry* gives, for 66 Be sulphuric acid at 25 deg. C, $\rho = 113.8$ lb. per cu. ft. and $\mu = 23$ centipoises. Using these values in Eq. (3) yields a Reynolds number of 2,700, so C (from Fig. 2) is 0.64. This new value of C in Eq. (6) yields $d = 0.377$. Recalculation of d is not warranted by the precision of the equation.

If several batches are to be run out of the same vessel, an equation relating percent change in flow to percent change in head permits the rational selection of distance a.

$$\text{Since } q = V_sA = CA\sqrt{2g(h + a)}; q = 8.02CA(h + a)^{1/2}$$
$$dq = 8.02CAd(h + a)^{1/2}/2(h + a)^{1/2}$$
$$\text{and } dq/q = d(h + a)/2(h + a) \quad (7)$$

From Eq. (7), it can be seen that if a 15 percent change in q is permissible, a 30 percent change in $(h + a)$ is allowable. By the proper selection of a, it is possible to design so that the change in $(h + a)$ does not exceed any desired figure.

For example, suppose that a fixed time interval for adding 50 gal. of solution has been selected, but in order to avoid refilling the supply tank at frequent intervals, it is decided to add three batches from the tank before it is refilled. The maximum allowable variation in the batches thus added is 10 percent. By Eq. (7)

$$d(h + a)/(h + a) = 2dq/q = 2 \times 0.10 = 0.20$$

From this, the change in the total head on the orifice $d(h + a)$ must not exceed 0.20 of $(h + a)$. If it is not practical to place the tank feeding the orifice more than 20 ft. above the orifice discharge point, then $d(h + a)$ must not exceed $0.20 \times 20 = 4.0$ ft.; since this height must equal the sum of the three batches (150 gal.) the tank diameter which must be used is

$$7.481d(h + a)\pi D^2/4 = 150$$
$$D = 2.52$$

The possible applications of the ancient combination of pot, pipe and hole in modern processing, particularly for batch processes, are far greater than one might imagine.

* "Chemical Engineer's Handbook," McGraw-Hill Book Co.

How to Get a Job —the Right Job

Do's and Don'ts for young engineers —with comments by an experienced employment director. These practical tips from a young engineer who learned the hard way, will help make your first job the right job. It may be your most important.

BARRY MOYERMAN
with comments by
S. L. STARKS

Many new experiences await you in your first job as a chemical engineer—experiences which can have a far-reaching effect in molding your growth both as an engineer and as a person. As part of a production team, you will be able to take pride in your contribution to the value of the finished product. As a designer, you will be able to watch your ideas grow from mental images and vague sketches to the physical reality of permanent machines and structures. As a man, you will feel the satisfaction which comes from working cooperatively with other men toward a common goal.

These thrills that come from being part of a dynamic production team are greatest and last longest when you are in the right job. If you are to achieve real and lasting job satisfaction as an engineer it is most important for you to find—and to hold—this right job.

WANTED: THE RIGHT JOB

The selection of your first job is especially serious because it will be an important stability factor: future employers

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BARRY MOYERMAN *graduated from Drexel Institute with first honors in chemical engineering. After working as project engineer with Publicker Industries, Inc., he started his own business in Philadelphia as a representative of process equipment manufacturers. This article, he says, "comes largely from my own personal experiences."* S. L. STARKS, *whom we invited to be the "commentater" for this article, is director of technical employment for Dow Chemical Co. in Midland, Mich.*

DON'T overlook possibilities in your own backyard

DON'T forget that appearance is important

DON'T make money your only consideration

DO make personal plant visits by appointment

DO have extra copies of resumes

DO write "thank you" notes

often look askance at a spotty work history. As a young graduate, you should avoid needless job changes.

The trouble about getting the proper first job is not so much with the lack of jobs but with the lack of really effective means for matching men and jobs. Because each man has different capabilities, personality, aptitudes and interests there is no one all-inclusive sure-fire job hunting method. The pattern of behavior which I will describe gives my view of this many-sided question of getting started in chemical engineering.

Graduation from an accredited engineering school with "respectable" grades will almost automatically assure you a few job interviews. But since getting a job should imply much more than finding a source of income, you may be unwise to accept the highest paying offer. It is easy to be railroaded into taking what may prove to be an unsuitable job. There is a great temptation to jump at the first offer. Successful and meaningful job hunting should be systematic; you should consider each offer carefully and compare it to other job opportunities.

FIRST: SELF-EVALUATION

Rather than being a time for collecting "automatic" job offers, graduation is a time for self-evaluation—a time for an honest look at your likes and dislikes. During this period of introspection you should ask yourself a lot of questions. "Do I really like the field of engineering or would I be happier in some related field such as technical sales? Am I cut out for research? Do I like laboratory work? Have I studied any particular subject which has made a deep impression on me and left me with a desire to learn more about it? Do I like production and operation? What is the basis of my likes and dislikes; are they the result of some casual industrial experience or personal knowledge? Have they some factual or emotional basis?" Careful self-evaluation will help you to answer these questions honestly and realistically.

> (STARKS: *"If you are going to be rather selective about the nature of your first job, then you should think out very carefully the questions that Moyerman gives before you go for an interview. You should tell the interviewer why you prefer certain restricted types of work. Good reasons why you have decided on technical sales, production, design or research will impress him. But he will not be impressed unless you ask to be considered for any job open to an engineer in your field of training."*)

Your job hunting will require stamina, patience and strength—especially when you are looking for "the" job rather than "a" job. Locating the position will require time and effort; but the experience and the knowledge you gain should make this period one of the most valuable "courses" in your engineering education.

NEXT: WHERE TO START

As a job seeker, you must limit your horizon to your own community or decide whether you will also consider distant locations. The grass may look greener elsewhere—but schools in that very same "green" area may be graduating engineers who will also be seeking employment there. It well may be that your own community is an industrial

center. If so, you should explore local job opportunities thoroughly before giving any thought to going elsewhere.

Most communities have public and private employment agencies that can place engineering graduates. Public employment services charge neither for registration nor placement. Private services, some of which specialize in placing technical personnel, make a charge which is usually payable during your first period of employment.

Many schools and colleges have their own placement services to help their graduates. Advertisements in newspapers and technical magazines and information from your friends who are working in industry can also give you leads. All of these should be used to supplement but not to replace your own job hunting campaign.

THEN: SELL YOURSELF

The job hunter plays two roles—the salesman and the student. As a salesman, you are interested in selling a most unusual and superior product, yourself. You must know your own capabilities, aptitudes and interests and be able to speak of them freely and to give an organized and interesting presentation of facts. One helpful technique is to carry a folder with a transcript of your school records, copies of writings, evidence of student activities or honors and other visual aids which you can use to good advantage during an interview.

> (STARKS: *"Give an extra copy of this material to the interviewer. He can spend more time evaluating you if he doesn't have to take notes."*)

The importance of an all-out selling effort cannot be over-emphasized. You should check every item of apparel, as well as hair, nails and teeth, before going into an interview. Your manner of approaching the interviewer, your carriage, even your handshake may be important in determining what his opinion of you will be.

> (STARKS: *"While it is important for you to practice all possible courtesies, it is most important to be natural. Yet a skilled interviewer will quickly detect any excessive build-up on this point. The good interviewer trains himself to be kindly, friendly and pleasant; he tries to put you at ease quickly so he can benefit from the mutual feeling. I repeat: the most important thing is to be yourself in a perfectly natural way!"*)

In many cases, especially where there has been no formal job lead, the interviewer may not have an opening which must be filled immediately. But if he can be really interested in you and convinced that you have training, experience, aptitudes and personal traits which his company can put to good use he may go out of his way to find or even create an opening for you.

IMPORTANT: BONE UP

If you apply scientific and orderly engineering training to your job hunting, this process likewise becomes scientific and orderly. It should give you a good over-all picture of what each industry has to offer. In an organized exploration of job opportunities, a list of local companies according to industry is a must. Among the many sources which you can use for this purpose are the classified telephone directory, Thomas' Register, Dun and Bradstreet's Directory, Poor's Industrial Manual, advertisements in trade journals, personal knowledge and annual engineering catalogs.

The more detailed your list is the better it can serve you. It should contain not only the names and locations of companies but information about their officers, history, relative size, main products and production facilities. The companies should be grouped geographically so that you can keep traveling time between calls to a minimum.

> (STARKS: *"The interviewer is quite apt to ask, 'Do you know something about our company and our main products?' It is important to be able to answer, 'Yes,' thus indicating your alertness. If your answer is negative—or mostly so—the job of selling yourself will be harder."*)

Any industry on the list may serve as the starting point for one of your life's most interesting experiences. You should spend some time reading about the industry you select as the first to explore. Spend enough time on each industry to cover all the companies listed in that category. You should fortify yourself with information about the raw materials that are used, the processing steps, some of the terms or names that are peculiar to that industry.

A good book for material of this sort about the chemical industries is "Chemical Process Industries" by R. Norris Shreve. It is possible for you to learn enough about an industry by reading to speak intelligently about it, to ask questions intelligently and to realize the significance of the observations you make in the plants you visit. Subsequent visits to prospective employers will add to your knowledge; the sum total of the information gathered about a particular industry in this way may be an important factor in your estimate of the opportunities that industry can offer to a chemical engineer.

> (STARKS: *"Most large colleges and universities have reading rooms in their placement centers where you can get this type of information."*)

VITAL: PERSONAL VISITS

It is perfectly understandable that you may feel tense at the prospect of walking into a plant or an office "cold," unexpected and unheralded. A few interviews will show you that there is no reason for this feeling. You will get a pleasant reception and good counsel in most plants. It is the personal visit which I stress, for it is much more effective than any form letter in giving a true picture of yourself. The trip to the plant, the actual scene of operations, will in turn give you an idea of what the company and the industry are like.

> (STARKS: *"To be of much value, your personal visits to plants must be planned. You will usually have to have formal appointment before you can contact the most important people or see any part of the plant of main interest. This is probably most true of those companies that practice college visitation for interviewing and selecting technical men."*)

You can use certain techniques to make your entrance into the company office a little less abrupt. If the prepared list fails to provide you with the names of company officials, a telephone call to the plant can be productive. A talk with the operator will reveal who is in charge of hiring engineers and during what hours he is usually available. It may be necessary for you to make a formal appointment, but too many of these will result in a rigid schedule which may prove a handicap.

The timing of your visit is important. Mid-morning about 10:30 and 2:30 in the afternoon are usually ideal times. Common sense will dictate that people who are thinking of going to lunch or of cleaning up loose ends before going home may not give you their full attention. Your calls should have a leisurely tone. It is best to cover only a few plants each day so that you feel fresh and can make the most of each visit.

It is important for you to be as mentally alert as possible

during your interview. Some employers value the ability of a man to think when he "on the spot"; they may therefore come up with some peculiar opening remarks. One employer's opening question was, "Are you honest?" Some of the less unusual openers are, "Why do you want to work for this company?" or "What good do you think you can do around here?"

One of the blitz-krieging techniques used by one employer began with the opening remark, "I give all men who come to see me for jobs just three minutes." Then in quick succession followed a barrage of questions which included, "What is the distance to the sun?"; "What is the cost of 1,000 pounds of steam?", "How far can I see from this office window (which was on one of the upper stories of a sky-scraper)?"; "What chemical reaction takes place when you take a bath?"

The average employer, however, has no such pet routines. His object is to make a thorough analysis of the job seeker who is before him. By the same token you, too, are seeking information about the job, the company, its employees and the industry of which it is a part. During this process of give-and-take you should be (or at least act) relaxed. Give evidence of your real interest.

QUESTION: TYPE OF WORK

If the employer is interested he will usually turn the interview toward the subject of the type of work you want to do. Your answer to "What do you want to do?" should never be, "I'll do anything"; that is the equivalent of saying "nothing".

Rather than give indefinite replies, show the interviewer the items listed on your prepared personal balance sheet. If there is an absence of casual work experience on which he can base his opinions, you should say so. Then follow up with remarks about interesting courses or the type of work which you feel like doing—and your reasons. The content of your presentation, the manner and enthusiasm which you display and the approach you use will all reveal factors to the interviewer upon which he will base his judgment of your suitability for certain types of work.

> (STARKS: "*I am prompted to encourage those young graduates who are not too certain just exactly what type of work they would like best. Flexibility is sometimes looked for. I do not mind interviewing a young man who says right at the start that he would consider any job suitable to his training. If I had a position that his educational background would qualify him for, I would look with favor upon him as an applicant.*")

Broadly speaking, the following fields are open to inexperienced chemical engineers: research, plant engineering and development, new equipment design, production supervision, plant operation and sales. Usually it is enough to indicate your interest in one of these fields. The exact nature of the jobs which fall in each of these categories varies from company to company. Therefore it is not really possible or desirable to give the interviewer a job description in telling your desires and choices. On the other hand, very often he will give a brief description of the type of work that is done in each of these general divisions within the company.

OH, YES: THE PAY

Another subject of the interview is salary. Very often, particularly in large organizations, this question is academic since definite wage scales are set for new employees. The question, "How much do you expect?" is sometimes asked for the purpose of getting a clue to your personality rather than as an invitation to bargain. There are several satisfactory answers to this question. A survey of industries will indicate the average salary for each and will serve as a basis for making your reply. The general tenor of the interview should serve as your guide in answering this important question.

If the employer has an opening in mind he will very often ask you to meet the department head or engineer in whose unit the vacancy exists. This introducion is the beginning of another interview. Usually these operating heads will give you a clear and detailed picture of what the particular job involves.

> (STARKS: "*If the interview leads to a job offer, you should make sure you understand what the job is. There should be no element of doubt in your mind about salary, working hours and general company policy that may directly relate to your welfare. Many times you may be interviewed by several representatives of a company; each may think the other made these points clear. If not, it is only good business for you to ask questions until you fully understand every major point.*")

The manner in which job offers are made differs from company to company. It varies from a direct "when do you want to start?" at the end of the interview to receipt of a formal offer by mail weeks after the interview. If a systematic search for "the" job is being made, you may often want to ask for time to think the offers over. It may be wise not to jump at the first offer.

NO OFFER: YOU STILL GAIN

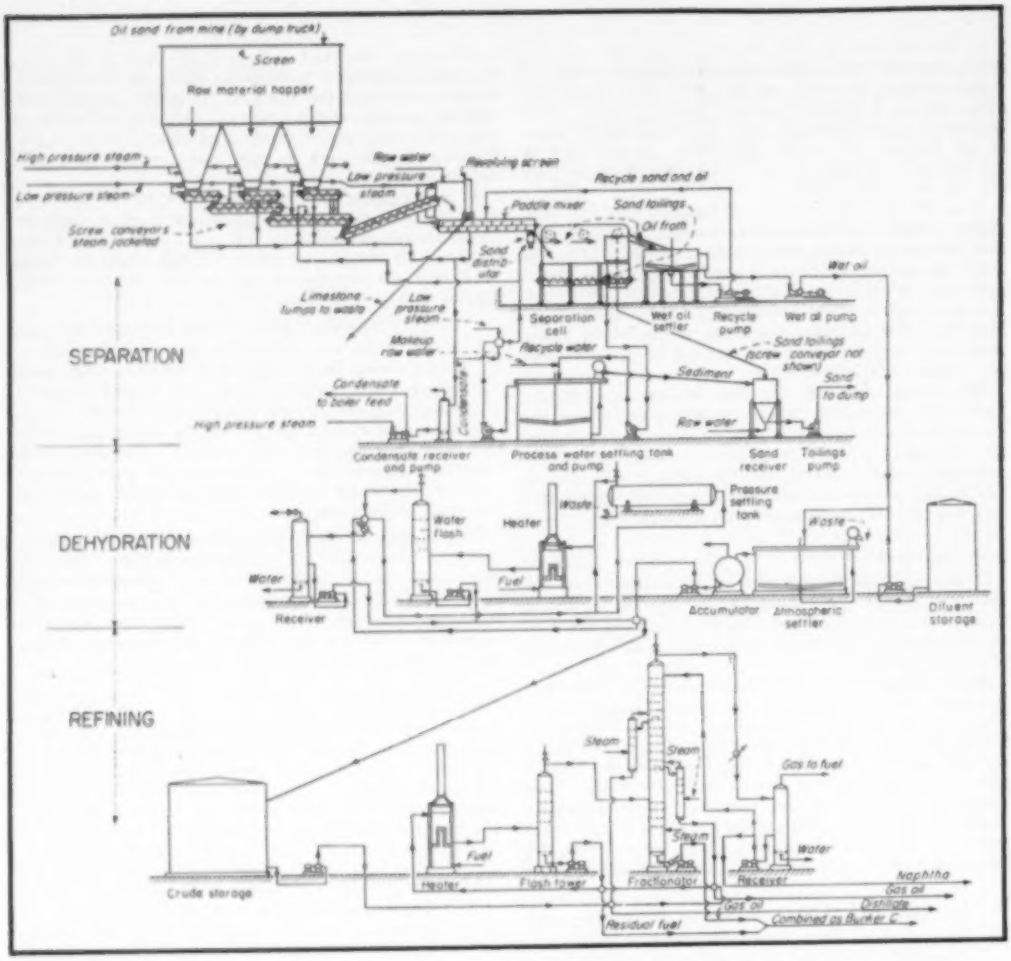
The interview which produces no job offer is also important. If you are prepared to handle an interview skillfullly, you strive to prevent it from ending with "We have nothing for you at this time." True, the immediate object of your personal visits is to receive offers of employment. There are, however, other important concomitant objectives. The use of the interview as a way of learning about the industry must not be overlooked. It provides an opportunity for you to ask questions, to observe work performed, to get wage scale information and to meet men in the plant.

The interviewer who has just said, "We have nothing for you", though no longer a prospective employer, is still a man with practical experience and information in a field in which you are interested. Frank and friendly conversation directed toward asking the interviewer's advice on opportunities in the industry may produce an equally frank opinion on its prospects. The mere fact that you are genuinely interested in a systematic job search and ask for guidance strikes a friendly chord and often produces unusual usable leads. Interviews followed through in this manner may enable you to walk into the next plant on the list and say to the superintendent, "Mr. Jones, whom I spoke to yesterday, suggested that I come to see you."

LAST: DON'T FORGET

After your interview it is a good will gesture and a mark of good taste to send the interviewer a thank-you note. In many situations which do not end with a "closed door" you should ask to be kept in mind if an opening turns up in the future. Some of your thank-you notes can produce delayed action results far out of proportion to the time it takes you to write them.

At regular intervals the offers which you receive should be examined and evaluated in the light of the accumulated industrial information. If you have conducted the job hunting campaign properly, there should be among the offers one job which is both a challenge and an opportunity.



SEPARATION and DEHYDRATION

Oil sand feed rate (tons per 24 hr.)	500
Water in feed after adjustment (percent by weight)	11.3
Steam consumption for heating (lb. per hr. at 8 psi.)	2,300
Temperatures (deg. F.)	
Screen inlet	110
Mixer outlet	135
Recycle water (at heater outlet)	200
Separation cell	185
Wet oil settler	130
Diluted crude settler	162
Dehydration heater outlet	415
Flash tower	250
Water receiver	100
Pressures (psi.)	
Tailings discharge	22
Recycle water	21.5
Raw water	62
Dehydration heater inlet	45
Dehydration heater outlet	20
Flash tower	15
Pressure settler	25
Analytical Data	
Oil sand feed (after adjusting water content)	Percentage
Water	11.3
Oil	11.0
Mineral matter	77.7
Oil (dry basis)	12.4
Separated crude	
Water	25.0
Oil	68.0
Mineral matter	7.0
Wet diluted crude (after settling)	
Water	19.3
Oil	78.2
Mineral matter	2.48
Dry diluted crude (to storage)	
Water	0.24
Oil	97.96
Mineral matter	1.80
Underflow diluted crude settler*	
Water	58.3
Oil	12.5
Mineral matter	29.2
Tailings	
Oil	1.13
Underflow diluted crude settler*	
Solids	18.3
Overflow process water settler	
Solids	0.22
Crude recovery (as theoretical oil)	89.5
Diluent loss (as theoretical oil)	1.2
Net oil production (as theoretical oil)	77.1

* Contains extra water added to increase fluidity. Actual underflow is of the order of 18 percent water, 26 percent oil and 56 percent mineral matter.

REFINING

Charge rate (bbl. per day)	420
Temperatures (deg. F.)	
Heater inlet	500
Heater outlet	525
Flash tower	700
Fractionator top	300
Fractionator bottom	590
Naphtha receiver	100
Pressures (psi.)	
Heater inlet	85
Heater outlet	50
Flash tower	12
Fractionator	11
Naphtha receiver	8
Yields (volume percent of charge)	
Original diluent	24
New diluent	6
Blended fuel oil	59
Gas and loss	1
Physical and Chemical Data	
Charge stock (diluted crude)	
Gravity (deg. API)	11.7
Basic sediment and water (percent)	1.97
Viscosity (Saybolt sec. Furol at 122 deg. F.)	100
Naphtha	
Gravity (deg. API)	44.5
ASTM distillation (deg. F.)	
Initial boiling point	130
10 Percent	278
50 Percent	346
85 Percent	400
90 Percent	414
End point	457
Octane number (clear)	66.8
Sulphur (percent)	1.3
Diluent	
Gravity (deg. API)	33.0
ASTM distillation (deg. F.)	
Initial boiling point	370
10 Percent	404
50 Percent	502
90 Percent	662
End point	720
Blended fuel oil	
Gravity (deg. API)	6.2
Viscosity (Saybolt sec. Furol at 210 deg. F.)	62.6

Novel Separation Process Unlocking Canada's Oil Sands

Here's a firsthand technical report on the engineering that is winning precious petroleum from the Athabaska sands, whose treasure is a legend.

W. E. ADKINS

What is probably the only plant of its kind in the world, the demonstration plant up in Canada at Bitumount on the Athabaska River, is now successfully extracting petroleum from Alberta's fabulous oil sands. These sands constitute the largest single reserve of petroleum in the world. Cost data, as yet unreleased, on the present operation indicate that the oil sands possess basic advantages over oil shale or coal as a source of liquid fuels. Mining the sands is less expensive, and capital outlay probably lower than that for processing oil shale or coal into liquid hydrocarbons. Here, then, is a first report on how the sands are mined, how the all important separation process works, and how the crude is dehydrated and refined.

The idea of getting oil from the Alberta sands, which, incidentally, were first recorded by Alexander Mackenzie in 1789, has always presented a challenge to the best technical minds. For this vast treasure in black gold is estimated by the U. S. Geological Survey and other agencies to contain anywhere from 100 billion to 500 billion gallons of oil. And these are just educated guesses based on limited exploration. Surface exposures alone indicate an area roughly 80 miles by 60 miles. The beds of oil sands, known as the McMurray formation, are approximately 200 ft. thick, although there is considerable variation. Saturation ranges from as low as 3 or 4 percent to as high as 16 percent by weight. Many processes for recovering this tempting wealth have been suggested; some have even been tried. For example, a previous plant, near the present one at Bitumount, was built by Oil Sands, Ltd.

It remained for the socialist government of Alberta, which controls this greatest source of petroleum, to pass legislation in 1944 calling for design and construction of this demonstration plant to find out whether extraction of oil from the sands was possible and to get data for the building of large commercial units, should they be practical and ever necessary.

Capacity of the plant was tentatively set at 350 bbl. per day, when charging sand containing 15 percent oil by weight. Laboratory work in conjunction with the design was handled by the Alberta Research Council, directed by Karl Clark. With data supplied by the government of Alberta's Oil Sands Project, the Born Engineering Co. of Tulsa, Okla., did the design work. After initial runs in September and October of 1948, some alterations were made, and now the plant is running smoothly.

W. E. ADKINS, *superintendent, is in charge of administration and technical work at Bitumount, site of Alberta's Oil Sands Project.*

MINING

The oil sand deposits consist of unconsolidated sand, clay and silt containing varying amounts of heavy asphaltic oil. Overburden varies from a few feet of clay and decayed vegetation to several hundred feet of shale and sandstone. The sand itself ranges from 50 to 200 mesh with varying amounts of particles finer than 200 mesh. The oil is largely in the form of thin films surrounding the sand grains. Unless concentration has occurred due to natural movement of water or some other force, the oil content does not exceed 16 percent by weight.

Analysis of the separated oil yields the following information:

Specific Gravity at 60 deg. F.	1.004
Distillation Range	Weight Percent
Up to 200 deg. C.	1.6
200 to 275 deg. C.	9.6
Residuum Above 275 deg. C.	84.2
Distillation Loss	4.5
Asphaltenes	26.2
Ultimate Analysis	
Carbon	82.6
Hydrogen	10.3
Sulphur	5.4
Nitrogen	0.4
Oxygen	0.2

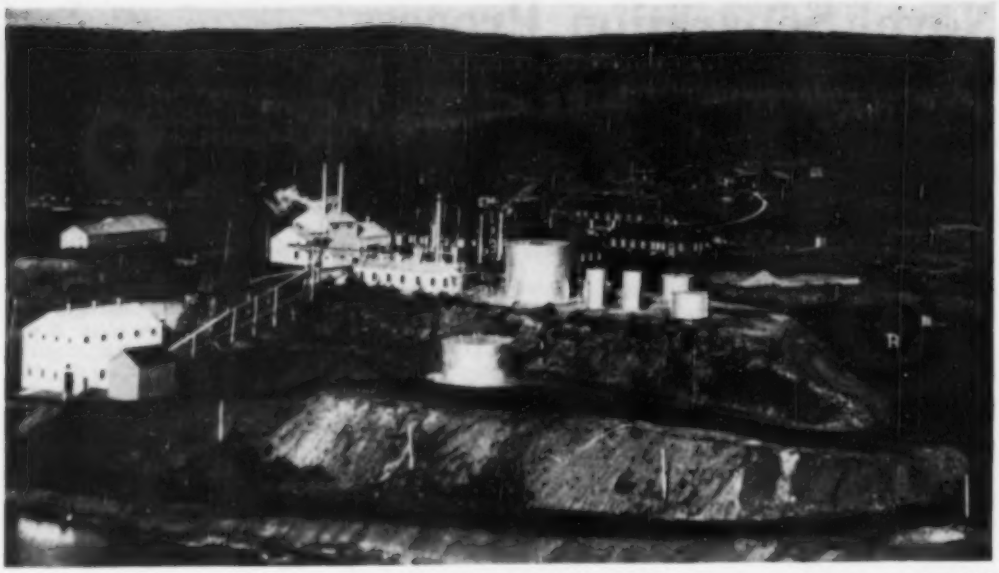
Bordering the Athabaska River and its tributaries, the sands are exposed or lie under very light overburden and can be mined with relative ease by open pit methods. Such conditions exist at Bitumount, site of the demonstration plant.

A ¾-cu.-yd. power shovel does the mining. Dump trucks, operating on an 8-min. cycle, haul 5-ton loads of oil sand to the separation plant. A 400-ton storage bin at the plant permits all mining to be done on the day shift.

SEPARATION

Continuous injection of high-pressure steam into feed hoppers beneath the storage bin insures uniform feeding of the sand to the separation plant. The steam plasticizes the sand so screw conveyors can move it readily. Feed screws on each hopper can be operated individually or together. Collecting screws immediately underneath carry the oil sand forward into the plant. All conveyors are steam-jacketed, gradually heating the sand as it is fed. Hot water is added to adjust the gross water content of the feed to about 12 percent by weight. Screw action reduces lumps and mixes oil sand and water intimately. A rotary screen removes limestone and other foreign bodies. The oil sand passes through the screen as a heavy pulp containing about 25 percent by weight of liquid. Adjusting a weir at the discharge end regulates retention time in the mixer. During mixing the oil film surrounding each sand grain is broken, and the sand is wetted with water. The tiny oil particles so formed coagulate to form droplets. These are aerated by agitation in the mixer. This aeration is vital if the high specific-gravity oil is to float in the separation cell.

In the distributor, the oil, water and sand are mixed with 200-deg.-F. recycle water circulating at a 400-gpm. rate. The resulting violent agitation breaks up any remaining lumps. Thus the sand enters the cell as individual grains and oil inclusion is prevented. Further aeration makes the bulk of the oil a buoyant froth that floats readily. Conditions in the separation cell are quiescent, so all but the finest mineral matter settles rapidly and is carried along the trough bottom to the foot of a twin-screw dewatering conveyor. This lifts the sand above the liquid level in the



DEMONSTRATION PLANT. Government of Alberta has put $725,000 into its plant at Bitumount, which has a capacity of 350 bbl. a day if the sand charged contains 15 percent oil by weight. Plant's unique process successfully extracts oil from the sands.

cell before discharging into the tailings receiver.

The oil-water interface in the separation cell is maintained slightly below the reach of three sets of rotating paddles that carry the oil out of the cell.

Presence in the oil sand of fine clay, which reduces recovery and increases the mineral content of the separated oil, can be minimized by preventing concentration of clay particles in the plant water. This is done by continuously withdrawing and settling water from the separation cell. A conventional thickener removes almost all fine clay particles, then the water is reheated and recycled. Underflow from the thickener is pumped into the tailings receiver and discharged with the tailings.

At pulp densities up to 50 percent solids, sand tailings can be pumped considerable distances. Velocities should be kept between 8 and 9 ft. per sec. Lower velocities result in settling; higher velocities, in erosion. Velocities can be as low as 2.5 ft. per sec. for short runs not exceeding 8 to 10 ft. of line. In actual practice, the tailings pump suction and discharge are carefully sized, taking into account the quantities handled and the friction losses. Then sufficient water is added to prevent fluctuations in discharge pressure, which is indicated by a volumetric pressure gage at the pump outlet.

Bearings on much of the equipment are water-sealed. Bearing material is a tough textile fabric impregnated with a synthetic resin. Water lubricates the bearing and seals it against entry of abrasive material. Molded synthetic rubber combats erosion on valve seats and pump linings. By keeping conveyor speeds low, wear on this equipment is limited, so special wear-resisting alloys are unnecessary. Automatic controls reduce labor and eliminate personal error.

Oil leaving the separation cell contains 25 to 30 percent water and 4 to 8 percent mineral matter. Normally, entrained mineral matter consists of very fine clay particles, some almost colloidal, and very little settling takes place in the wet oil settler. When separation is poor, however, considerable sand carries over. Some of these sand particles do settle, carrying with them appreciable amounts of oil. To save this oil, the settlings are recycled to the head of the plant by a 6-gpm. pump.

DEHYDRATION

Final cleaning-up of the crude is accomplished by diluting, settling and flash-vaporizing the remaining water. Diluent is a 30-deg.-API distillate produced in the refinery.

Originally, it was felt that a minimum dilution ratio of 50 parts diluent to 100 parts crude (dry basis) was necessary to give effective settling. Experience has shown, however, that the degree of dilution has little bearing on water removal at this point, while mineral deposition is much the same with dilution ratios as low as 30 parts per 100.

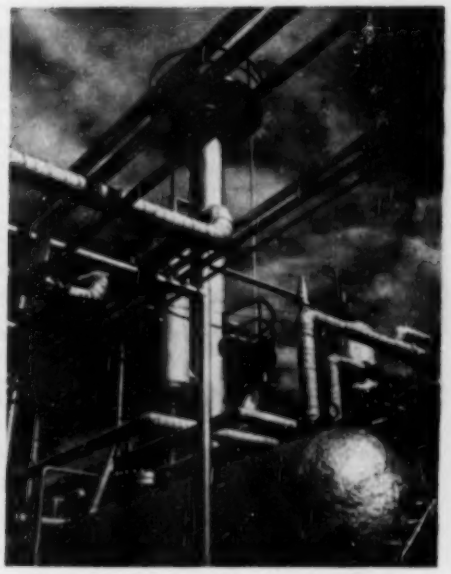
Diluted crude overflowing the settler contains 20 to 25 percent water. Water content can be reduced by extended settling. But this results in deposition of much more emulsion, with proportionately greater loss of oil. Practice, therefore, is to restrict settling time to the minimum required to reduce mineral content to a point at which the oil can be safely charged to the refinery.

Gross loss during this cleaning-up operation averages 10 to 15 percent of the theoretical oil charged to the separation plant.

While much of this loss could be recovered by putting the underflow from the settler through a secondary recovery treatment, a more direct approach is preferable. For secondary recovery calls for additional equipment, and it does not eliminate the problem of the stable emulsions formed during and after separation. A means of handling and dispersing these emulsions, immediately after dilution, is needed if this loss is to be avoided economically.

Water in the diluted crude overflowing the atmospheric settler is removed by heating to 400 deg. F. under 20 to 30 psi. back pressure in

MINING OIL SAND. No derrick in sight, as shovel scoops sand into dump truck. Athabaska sands hold biggest single oil reserve.



REFINING CRUDE. This fractionator splits the crude into naphtha, distillate, light gas oil and heavy gas oil.

a conventional tube still and flashing. Distillate flashed with the water is recombined with dry crude from the bottom of the flash tower. Heat exchange minimizes fuel requirements for this step.

REFINING

Since the primary purpose of the demonstration plant is to study separation, refining is restricted to a mild vis-breaking operation. It has three main functions: (1) recovery of diluent added to facilitate cleaning of the crude; (2) production of new diluent to balance production losses; and (3) production of fuel oil for the powerhouse, refinery heater and dehydration heater.

Dry diluted crude is heated to 825 deg. F. under 50 psi. back pressure and flashed. Overhead from the flash tower is fractionated into naphtha, distillate, light gas oil and heavy gas oil. At present, the three top cuts are combined as diluent. This will be discontinued when a big enough diluent supply has been accumulated. Heavy gas oil is recombined with the flash tower bottoms and the blend used as fuel oil.

Despite all previous information to the effect that oil sand crude decomposes at low temperatures with pronounced coke formation, no coking difficulties have been encountered.

Two oil-fired, double-drum, water-tube boilers, each rated at 6,000 lb. per hr., generate steam. Electric power is supplied by a turbine-driven generator rated at 350 amp. per terminal. A diesel-driven generator (175 amp. per terminal) is used for standby power but can be synchronized with the larger unit if required. The powerhouse also houses air compressors, water filters and fuel-oil tanks.

As it stands, the plant represents a capital outlay of about $635,000. This includes site preparation, grading, road building, powerhouse, separation plant, dehydration and refinery units, shops and warehouse, garage and mining equipment. Another $90,000 has been spent on camp buildings and equipment, office, laboratory, transportation equipment and other facilities.

Transportation between railhead at Waterways and the plant, a distance of 55 miles, is chiefly by water. Since construction started in February 1946 the project has operated a tug and two barges on the river during the summer. Float-equipped planes also land on the river, and a 3,000-ft. airstrip has been laid down near the plant. In winter, snowmobiles and tractors run on the river ice. Communication with outside points is maintained by two-way radio.

Continuous operation requires 48 men. This includes all supervision, office and clerical help, laboratory staff, camp employees, boat crews and an agent at Waterways.

PROSPECTS

Continuing research is certain to result in cost-cutting improvements. Already under way are pilot-plant investigations of a cold-water separation process and a fluidized-bed operation. More study is needed to ascertain the best techniques for refining the separated oil. In general, the scheme will have to include an upward adjustment of the hydrogen-carbon ratio, either by the addition of hydrogen or the removal of carbon or both.

Meantime, by their unrelenting efforts, Canadian engineers are proving in the demonstration plant set up by the government of Alberta that their unique process for separating oil from sand will work. Strip mining of oil sand from Alberta's vast reserves is feasible. Technical ingenuity at last is unlocking the oil-rich Athabaska sands.

If Your Issue Is Late

Many railroads have had to cancel some of their trains because of the coal strike. This in turn is upsetting mail schedules. We regret the delay—and wish there were something we could do about it.—Editor

APPROXIMATE MINIMUM COST OF VARIOUS ION EXCHANGE OPERATIONS

Operation	Water Composition, ppm. $CaCO_3$	Feed Rate, gpm.	Exchanger	Treatment Cost $/(lb-equiv)	Regenerants	Labor	Fixed Charges	Wasted Water	$/1,000 gal.	Installed Investments, $/(lb-equiv)
Softening	50	125	M. C.*	2.46	23%	20%	44%	14%	0.030	3600
Softening	50	125	H. C.*	2.45	29	11	52	8	0.021	3000
Softening	50	250	M. C.	2.55	31	8	45	17	0.022	2300
Softening	50	250	H.C.	2.50	34	3	60	8	0.019	2900
Softening	340	125	M. C.	1.92	41	18	18	20	0.11	820
Softening	340	125	H. C.	1.12	48	16	25	11	0.064	660
H-Cycle	A†	125	M. C.	4.76	14	27	47	12	0.064	5400
H-Cycle	B†	125	M. C.	5.86	36	23	44	7	0.086	5800
H-Cycle	B	250	M. C.	4.30	39	8	54	9	0.055	5400
Anion Exchange	A	125		20.0**	6	1	89	1	0.027	
Anion Exchange	B	125		6.00	40	7	49	6	0.089	7000
Anion Exchange	B	250		6.00	41	2	52	5	0.080	7500

* M. C. = medium-capacity sulphonated phenol formaldehyde exchange resin; H. C. = high-capacity sulphonated polystyrene exchange resin. † Analysis of Waters A and B are in text. ** Reducible by using less anion exchanger.

Cost of Ion Exchange

With this tabulation, and the reasoning behind it, you can calculate roughly the cost of installing and operating an ion exchange unit. Applies to process liquids or to water treatment. Accurate enough to tell, before wasting too much time on development work, if an ion exchange project is economically feasible.

G. P. MONET

Numerous articles describing the physico-chemical properties of ion exchange materials, their performance in packed beds, and various possible uses have appeared recently in the literature.* There is very little published information on the economics of ion exchange which deals with factors other than regenerant consumption. The objectives of the study presented here were to arrive at the minimum treatment cost and investment, considering all important factors, and to calculate cost in such a way that it would be applicable to chemical processing in general. The latter was accomplished by taking as a basis the cost of exchanging a unit amount of material in solution with the ion exchanger. Since exchange takes place between equivalent amounts of material, which is the formula weight of the ion in question divided by its valence, treatment cost was expressed in terms of dollars per pound-equivalent of material exchanged. Water treatment is a good example of ion exchange processing, and there are many data available on this application; therefore, it was used for cost analysis.

Current water treatment practice is to use the exchanger as a settled bed. The sequence of steps in the operating cycle is as follows: (1) raw water is passed downflow through the exchanger until the capacity is exceeded, as determined by analysis of the effluent; (2) the feed is cut off and the bed of exchanger is backwashed to reclassify it; (3) regenerant is passed down-flow to restore the capacity of the bed; and (4) the regenerant is rinsed out of the bed.

COST COMPONENTS

Materials, labor, and investment must be considered in order to calculate treatment cost. Minimum cost can be obtained by varying each of these factors. Materials include not only regenerants but also the water used for backwashing and rinsing, which is not a negligible cost in many places where water is purchased. Regenerant cost depends on the efficiency of regeneration; labor cost, on the frequency of regeneration; and investment, on the size of the unit. For a given set of feed conditions, the interrelationship of these factors can be demonstrated qualitatively in the following way. For example, labor cost can be reduced by decreasing the frequency of regeneration. This can be accomplished by using a bed of larger size or by using more regenerant. Use of a larger bed increases investment. More regenerant increases the cost of materials because the greater the amount of regenerant used, the less the efficiency of regeneration. The design and operation of an ion exchange installation leading to minimum expense for treatment depends on the relative costs of these factors.

The cost calculations which were made are necessarily arbitrary because (1) materials and labor costs vary widely, (2) labor in most water treatment plants is used only part-time for operation of ion exchange equipment, (3) a fixed relationship was assumed between the depth and diameter of the bed of ion exchanger, and (4) the range of water composition taken for comparison of treatment cost was not all-inclusive. The following assumptions were used for calculating cost:

Materials:—

NaCl, $/ton, 100% basis	12
H_2SO_4, $/ton, 100% basis	17
$NaCO_3$, $/ton, 100% basis	48
Raw water, $/1,000 gal	0.14
Water treated by cation exchanger in acid form, $/1,000 gal	0.20

Labor:—

Total cost, $/hr. 1.75

Requirements:

Operation	Operator's Time Per Cycle
Backwash	Full time
Regeneration	Full time
Rinse	Half time
Feed	12–15 min.

Fixed Charges:—

Approximate purchase price of all facilities is shown in Fig. 1. Cation exchanger is assumed to be $15 per cu. ft. and anion exchanger $50 per cu. ft. Installed cost equals 1.75 times purchase price less exchange resin. Depreciation and maintenance are assumed to be 15 percent of installed cost plus exchange resin.

Water Composition:—

Softening: 50–340 ppm. hardness as $CaCO_3$, equivalent to 3–20 grains hardness per gallon.

Demineralization

Component	Water A (ppm. as $CaCO_3$)	Water B (ppm. as $CaCO_3$)
Na	4.1	80.9
Ca & Mg	75.9	20.1
HCO_3	70.9	13.2
SO_4	8.9	4.6
Cl	0.34	62.0
Dissolved solids	80	80

Geometry of Bed:—

Bed depth = ½ shell height

Bed volume = ½ contactor volume

Limiting Flow Rates of Solution:—

In exhaustion = 5 gal./min., sq. ft.

In regeneration = 1.5 gal./min., sq. ft.

* For a general survey of ion exchange see *Chemical Engineering*, July 1947, pp. 123-130.

G. P. MONET is an ion exchange specialist in Du Pont's famed Engineering Experimental Station at Wilmington, Del. Thanks for help go to D. G. Cushing, C. S. Moore, Jr., W. J. Sloan and E. F. Von Wettberg, Jr.

SOFTENING COSTS

In the softening of water, a salt-regenerated cation exchanger is used to remove calcium and magnesium ions from water. In Fig. 2 is shown the cost of softening 125 gpm. of water containing 50 ppm. hardness by a sulphonated phenol formaldehyde cation exchanger which is of a medium capacity. The illustrated relationship of the variables is typical of all exchange reactions: (1) cost is a minimum, or nearly so, when the flow rate of the water is highest or the exchanger volume is a minimum, (2) cost increases with increasing volume of exchanger, and (3) cost is usually least at the highest regenerant efficiency. However, for some exchangers, as for the one shown, there is an optimum regenerant efficiency.

In Fig. 3 is shown the cost of softening two waters containing 50 and 340 ppm. hardness, respectively, at the optimum regenerant efficiency. In all cases, the minimum treatment cost is less for the high-capacity exchanger, which is a sulphonated polystyrene exchanger, than for the medium-capacity exchanger previously described. Furthermore, the greater the amount of material to be exchanged, as by treating a greater volume of water or a water of higher hardness content, the less the treatment cost.

DEMINERALIZATION COSTS

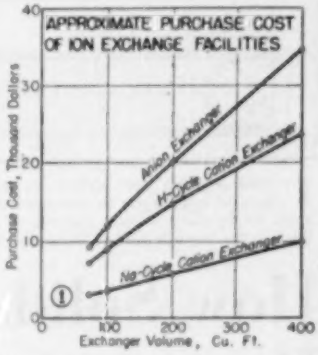
Demineralization of water is a two-step operation. In the first step, an acid-regenerated cation exchanger is used to convert salts in the water to acids. In the next step, mineral acids, HCl and H_2SO_4, are removed by a weakly basic anion exchanger regenerated with soda ash; CO_2 and SiO_2 are not removed from the water by the anion exchanger. (It now appears possible to deionize water by using a strongly basic anion exchanger, which is regenerated with caustic soda, to remove CO_2 and SiO_2). Fig. 4 shows the treatment cost of the acid cation exchange step at the optimum regenerant efficiency. As before, cost is less (1) when the flow rate of the water is highest or the exchanger volume is a minimum, and (2) when a greater amount of material in the water is to be exchanged. The exchanger used in this case is the medium-capacity cation exchanger. It should be noted that the cost of treating Water B is greater than for A because B contains a proportionately greater amount of NaCl than A.

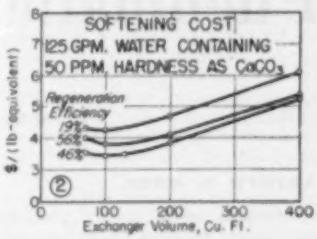
The adjoining tabulation is a summary of the minimum treatment costs obtained from data similar to those shown in Figs. 2, 3, and 4. For the cases investigated, the most significant conclusions are: (1) for softening, the range of treatment cost in \$/(lb-equiv) is about \$1-\$3.50; for acid cation exchange, \$4-\$6; and for basic anion exchange, \$6 and higher; and (2) the installed investment in \$/(lb-equiv) for softening is \$650 to \$3,500; for acid cation exchange, \$5,500; and for basic anion exchange, \$7,000. Fixed charges constitute about 45 percent or greater of the minimum treatment cost except where waters containing relatively large amounts of salts are being treated.

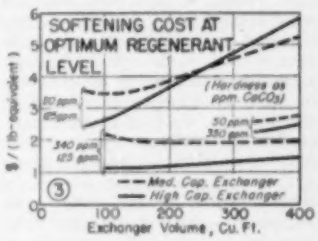
In order to secure minimum treatment cost and investment, the water flow rate in the contactor should be as high as permissible, exchangers of the highest capacity should be used, and the efficiency of the regeneration should be as high as is compatible with the quality of the water desired. It should be noted that the quality of the effluent produced, or the percentage removal of ions in the feed, may decrease as the regenerant efficiency is increased. This is not generally emphasized in the engineering literature.

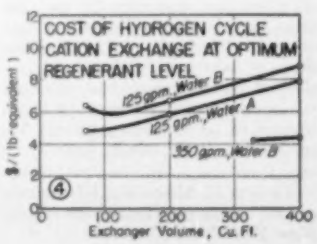
Judgment should be used in applying the foregoing conclusions to chemical processing in general, because of the limited scope of the study and because the processing conditions in other applications may be different from those assumed in this study. In processing applications, the concentration of the feed may be manyfold larger than in water treatment. In this study, the cost of treating water containing 340 ppm. hardness was found to be less (per lb-equiv. of solutes) than for 50 ppm., but the rate of decrease of cost with hardness values greater than 340 ppm. was not investigated. In applications where the feed is of constant composition, automatic operation may be used, which makes it possible to regenerate the exchanger as frequently as desired without increasing labor cost. While the conclusions reached in this study apply directly to water treatment, they should be used only for order-of-magnitude estimation of the treatment cost in chemical processing applications until a detailed analysis can be made similar to that presented here.

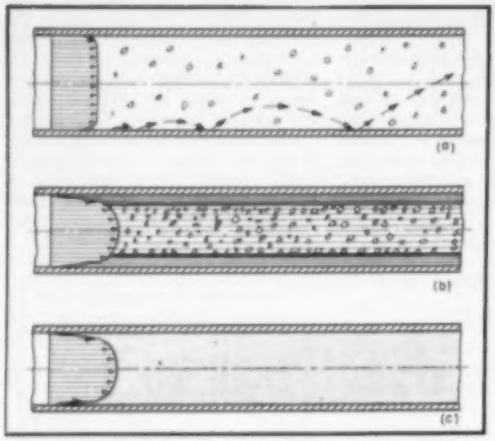
In conclusion, because of the relatively high treatment cost, ion exchange does not yet appear to be a panacea for problems in chemical processing. It does offer a unique means of removing ionic impurities, preparing pure chemicals free from ionic contaminants, recovering valuable ionic materials in dilute solutions, and catalyzing reactions. The economics of every processing application should be evaluated in a preliminary way before undertaking development work. Often it is found that with present operating methods the value of the product obtained is insufficient to justify the treatment cost. For example, the removal of impurities commonly found in water in order to improve quality is an economically sound operation for a wide range of water compositions. However, treating the water to recover impurities for their own value would not pay.



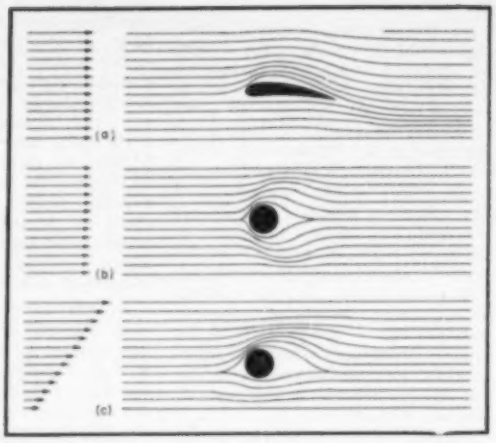





COST OF HYDROGEN CYCLE CATION EXCHANGE AT OPTIMUM REGENERANT LEVEL
$/(lb-equivalent)
125 gpm., Water B
125 gpm., Water A
350 gpm., Water B
Exchanger Volume, Cu. Ft.



1 Solid particles may advance by progressively increasing leaps in large pipes; in suspended condition if light and acted on by steep velocity gradient; or suspended as a true fluid if fine enough to be affected by Brownian movement.



2 Action of various shaped solids in air stream explains Fig. 1*b*: Airfoil tends to rise in uniform velocity air, but sphere experiences no lift unless asymmetrical flow pattern is created by increasing velocity in lateral direction.

How Solids Flow in Pneumatic Handling Systems

Dissatisfied with the empirical design methods at present needed for pneumatic handling, the author has taken a long step toward uncovering a rational approach.

ARTHUR H. KORN

Attempts made in the past to recommend pneumatic conveying design procedures have been and will remain unscientific as long as they are based on unpublished, unverifiable data, or even no data at all. Recently a number of treatises on the transport of solids by fluids have appeared in the literature. Each of the investigators has used different equations with different variables to correlate his own test data. For a comparison of the data presented by the different investigators—which on preliminary inspection seemed wholly contradictory—it was first necessary to find the most likely and most important variables by which flow of solids-laden fluids is influenced. It has been possible, at least to some extent, to reconcile apparent discrepancies, to locate sources of error, and to present the positive results in tabular form.

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CHARACTERISTICS OF FLOW

In laminar flow the movement of a fluid particle seems to be confined to a layer of the fluid. The theory supposes that adjacent layers exercise a drag upon each other, the so-called fluid friction. This, however, is only an invention for the sake of finding a convenient mathematical approach. Actually, no friction exists between the ultimate fluid particles.

The apparent fluid friction has its origin in the molecular movement which we perceive and measure as temperature. A molecule moves with incredible velocity, strikes other molecules and bounces back and forth in all directions billions of times a second. The mean absolute velocity of all the molecules in one layer is obviously the velocity of that layer. When molecules strike into an adjacent layer of lesser velocity, they naturally impart their greater kinetic energy to that layer and thus seem to drag that layer along.

The exchange of kinetic energy between layers is the true cause of the apparent fluid friction.

The invention of a hypothetical friction existing between layers of a fluid has been extended to the mathematical analysis of turbulent flow. In this latter type of flow the apparent fluid friction is again caused by the exchange of kinetic energy from layer to layer, that is the imagined but actually non-existent layers.

However, it is not the kinetic energy of individual molecules that is exchanged. Whole masses of the fluid, that is, clusters of countless molecules, shoot into adjacent layers and impart their greater kinetic energy to that layer or retard it as the case may be.

Similarly, no real friction exists between the fluid and the pipe walls. Individual molecules of the fluid adhere to the walls and form a stationary film upon which laminar boundary layers glide. Although fully covered by the laminar boundary layers, any surface projections of the pipe

walls, no matter how minute, deflect masses of the fluid away from the wall and thus cause an exchange of kinetic energy. In this case the masses deflected from the wall and shot towards mid-stream retard the fluid flow as if the pipe walls were offering a true shear-force resistance.

It is obvious then that the pipe resistance—the pressure drop in the pipe—is largely governed by the size, shape and number of the surface projections. In other words, the pressure drop is dependent on the magnitude and extent of pipe roughness; to borrow a phrase from hydraulics, dependent on the "wetted" perimeter.

The analogy can be carried still farther. Any solid particle suspended in the fluid, since its own velocity lags behind that of the fluid, will deflect masses of the fluid and cause an exchange of kinetic energy whereby the flow is impeded. Again, the resistance should depend on the magnitude and extent of the suspended solids. It is reasonable, therefore, to assume that if one particle of a given size, shape and weight will cause a given resistance, two such particles will cause twice the resistance. Moreover, if an air stream is loaded with a given amount of granular or powdered material of given physical characteristics, doubling the load should double the resistance. That such proportionality between loading and resistance or pressure drop prevails only within certain limits may be taken for granted.

BASIC EQUATIONS

The existence of a linear relationship between loading and pressure drop in a horizontal pipe was first proven experimentally for wheat and similar grain by Gasterstadt in 1924.

To get a dimensionless representation he expressed the loading as the ratio of the weight of solid material to the weight of air moved in a given time. This may properly be designated the specific loading:

$$\mu = w_m/w_f \qquad (1)$$

His choice of a dimensionless pressure drop measure was less fortunate. It was expressed as the ratio of total pressure drop of the suspended solids flow to the pressure drop of air alone. This means that the total pressure drop of a given loading was assumed to increase directly as the pressure drop due to pipe roughness. Obviously this cannot be true.

The effect of a solid particle upon the fluid flow is essentially the same regardless of whether it is floating freely in the air or adhering to the wall and thus constituting a pipe roughness. The total pressure drop, therefore, is the sum of the pressure drop due to pipe roughness, plus the pressure drop that is caused by the suspended material, rather than the product of the two.

More logical, much more convenient and certainly more nearly correct under varying conditions of pipe roughness is the dimensionless representation of the pressure drop as the ratio of static pressure drop to dynamic pressure.

The pressure drop of a fluid in a pipe of length S is given by

$$\Delta p = f\,h\,\frac{S}{D} \qquad (2)$$

where

$$h = \frac{1}{2}\,\frac{\gamma}{g}\,V_f^2 \qquad (3)$$

which is the dynamic pressure or velocity head.

For the unladen fluid pressure drop k_f in a pipe one diameter long we have

$$k_f/h = f \qquad (4)$$

As long as proportionality between specific loading and pressure drop exists, the pressure drop caused by the suspended matter in a pipe one diameter long is given by

$$k_m/h = b\mu \qquad (5)$$

The total unit pressure drop of air with suspended matter is

$$k = k_f + k_m \qquad (6)$$

or

$$k/h = f + b\,\mu \qquad (7)$$

The dimensionless ratio k/h may logically be designated the specific pressure drop. For unladen fluids the specific pressure drop is identical with the friction factor. Gasterstädt's test data have been re-examined and recalculated for the specific pressure drop k/h. The results are given in the table on p. 110.

THREE MODES OF TRANSPORT

It can easily be seen why solid particles should be lifted by an upflow air current. The greatest velocity a free falling particle can attain in a stationary fluid is the so-called terminal velocity. If the air instead of being stationary rises with a velocity greater than the terminal velocity, the free falling particle will be carried upward.

Pneumatic conveying in a horizontal tube, however, cannot be fully explained without taking into consideration the fact that the actual velocity of the fluid varies over the cross sectional area of the pipe. It is greatest in the center of the pipe and zero at the pipe walls. The exact shape of the velocity distribution curve changes considerably under varying flow conditions.

In a comparatively large pipe under conventional conveying velocities, the distribution may be fairly uniform. Such a horizontal air stream has no lifting or carrying capacity. It can only accelerate a free falling particle horizontally. The particle will describe a more or less parabolic curve and bounce off the bottom part of the pipe to begin a new leap. Due to gathering momentum the particle will be carried a greater distance in each succeeding leap, as indicated in Fig. 1a. That granular material is actually conveyed in pipes of comparatively large diameter in such a hopping manner can easily be verified, for the bouncing of the particles can be heard distinctly.

In narrow tubes and under greater mean gas velocities the non-uniform velocity distribution becomes more pronounced. A lifting force is then exerted on the particles for essentially the same reason that an airfoil is lifted.

An airfoil is lifted by a horizontal air stream of originally uniform velocity distribution on account of its peculiar shape. This creates a flow of greater velocity on its top side, with a resultant suction thereon. Fig. 2a shows this situation. A sphere, however, would create a perfectly symmetrical flow pattern, as in Fig. 2b. The air pressure on the sphere would also be symmetrical and consequently there would be no lift. But if a sphere is subjected to an air flow having a velocity which increases in the lateral direction, the flow pattern will be asymmetrical, as in Fig. 2c. It is essentially the same as that created by the airfoil and the sphere therefore is lifted. These are the conditions in a pneumatic tube.

With conveyed particles the veloc-

NOMENCLATURE

- b = Factor, dimensionless.
- D = Pipe diameter, ft.
- f = Friction factor, dimensionless.
- g = Gravitational constant, ft./sec.^{2}
- h = Velocity head of fluid, lb./sq. ft.
- h_{ms} = Velocity head of fluid-solid mixture, lb./sq. ft.
- k = Total pressure drop per one diameter pipe length, lb./sq. ft. Note that subscripts hor. and vert. refer to horizontal and vertical lines respectively.
- k_f = Pressure drop of unladen fluid per one diameter pipe length, lb./sq. ft.
- k_m = Pressure drop caused by material per one diameter pipe length, lb./sq. ft.
- k/h = Specific pressure drop, dimensionless.
- n = Exponent, dimensionless.
- S = Pipe length, ft.
- t = Terminal velocity head, lb./sq. ft.
- V_f = Mean fluid velocity, ft./sec.
- V_t = Terminal velocity, ft./sec.
- w_f = Mass flow rate of fluid, lb./sec.
- w_m = Mass flow rate of material, lb./sec.
- γ = Specific gravity of fluid, lb./cu. ft.
- γ_{ms} = Specific gravity of fluid-solid mixture, lb./cu. ft.
- μ = Specific loading, dimensionless.
- Δp = Pressure drop, lb./sq. ft.

ity always lags behind the air velocities. Also they are subjected to relative velocities that are greater on the inside and therefore they tend to be drawn towards the center of the tube. Moreover, if the particle is light enough in comparison to its size, and if the gradient of the velocity distribution curve is sufficient, it does not need to touch the pipe walls. A true state of suspension then exists during conveying and the solid material is confined to the central portion of the pipe, as in Fig. 1b. This mode of transport can readily be observed when coarse, yet light, particles are conveyed through glass tubes.

If the solid particles are extremely small, let us say close to the order of molecular dimensions, the terminal velocity of their free fall will for all practical purposes be zero. They will be subject to molecular-shock Brownian movement, that is, they will be buffeted around by the random movement of air molecules so that the air-solid mixture will have the properties of a true fluid and the well known laws of fluid dynamics will apply. Even larger solids for which Brownian movement no longer exists will be kept uniformly dispersed by the turbulence always prevailing in pneumatic tubes, as in Fig. 1c.

The specific pressure drop in this case is in accordance with Eq. (4):

$$(h_f + h_m)/h_{ma} = f$$

Since, according to Eq. (3):

$$\frac{h_{ma}}{h} = \frac{\gamma_{ma}}{\gamma} = \frac{w_f + w_a}{w_f} = 1 + \mu$$

the foregoing equation may be written:

$$h_f/h + h_m/h = f\,(1 + \mu)$$

or

$$h_{hor.}/h = f\,(1 + \mu) \qquad (8)$$

The pressure drop for upflow in a vertical pipe one diameter long will be greater by the amount of the static pressure caused by a fluid column one diameter high

$$h_{vert.} = h_{hor.} + \gamma_{ma}\,D$$

or

$$\frac{h_{vert.}}{h} = f\,(1 + \mu) + \gamma\,\frac{D}{h}\,(1 + \mu)$$

or

$$\frac{h_{vert.}}{h} = \left(f + \gamma\,\frac{D}{h}\right)(1 + \mu) \qquad (9)$$

This may seem only a hypothetical case. Yet any pressure drop equation that may lay claim to universality must be valid for this limiting case of minimum particle size and must be identical with Eqs. (8) and (9) for horizontal and vertical pipes respectively when $t = 0$ is substituted therein.

Re-examination of Data of Various Investigators, Using Eq. (10)

Investigator	Material	γD / h	h / t	Horizontal b	Horizontal n	Vertical b	Vertical n
Gesterstädt	Wheat	0.0072	2.7	0.0088	1	——	——
Gesterstädt	Wheat	0.0057	3.4	0.0070	1	——	——
Vogt and White	Wheat	0.0011–0.0002	3–14	0.0044	1	0.006	1
Vogt and White	Clover	0.0025	5.2	0.0087	0.855	0.020	0.855
Vogt and White	Clover	0.0011–0.0002	13–50	0.05 $(t/h)^{0.5}$	0.616	0.04 $(t/h)^{0.5}$	0.782
Vogt and White	Sand	0.0040–0.0002	2–34	0.05	$(t/h)^{0.455}$	0.05	$(t/h)^{0.782}$
Hariu and Molstad	Sand and Cracking Catalyst	0.0100–0.0015	2–408	——	——	Erratic 0.022	1
Belden and Kassel	Catalysts	0.0267–0.0089	0.84–6.36	——	——	°	0.802
Korn	Any	Any	∞	f	1	°°	1

*0.62 $(\gamma\,D/h)^{0.5}\,(t/h)^{0.155}$
**$f + (\gamma\,D/h)\,(1 + 1/\mu)$

If the equations serve no other purpose they provide at least a means to test the soundness of any pressure drop formula.

GENERAL PRESSURE DROP EQUATION

For most conveying installations the straight-line relationship between specific pressure drop and specific loading does not hold true. It is convenient then to use a potential function instead of Eq. (7):

$$h/h = f + b\mu^n \qquad (10)$$

This has the great advantage that the factor b and exponent n can easily be determined when test data are plotted on logarithmic paper; b and n are not constants but functions of at least two and possibly more variables. The most important one is doubtless the terminal velocity of the free fall of a particle V_t since this velocity has to be overcome by the air current.

Some investigators have employed a number of variables upon which the terminal velocity in turn depends, such as mean particle diameter, particle density, fluid density and the so-called shape factor which is ill-defined and nearly always unknown. The relation between these cannot be expressed by one simple equation: at least three different laws have to be taken into consideration. It is easy enough—and much more reliable—to find the terminal velocity experimentally than by theory. Moreover, for a number of commonly used materials it has been determined with accuracy. By using the terminal velocity, a number of variables are at once eliminated.

In the foregoing equations the velocity head has been used instead of the fluid velocity. The former, since it incorporates the density of the fluid, is more nearly representative of the carrying capacity of an air current. A similar substitution may be used regarding the terminal velocity, namely, the velocity head produced by the free-fall of a particle.

$$t = \frac{1}{2}\,\frac{\gamma}{g}\,V_t^2 \qquad (11)$$

As a dimensionless group for the terminal velocity we have then

$$h/t = V_t^2/V_t^2 \qquad (12)$$

As for the second variable, any pronounced dependence of the pressure drop on the Reynolds number can be ruled out for the simple reason that the flow of unladen gases in pipes is independent of the Reynolds number at high Reynolds numbers. (See the author's article, "Basic Equations for Fluid Motion and Pressure Drop in Pipes," in *Product Engineering*, May 1947.) Moreover, the greater the pipe roughness, that is the greater the turbulence, the sooner the flow becomes independent of the Reynolds number. The turbulence of solids-laden gases is incomparably greater than that produced by the roughest pipes. To be sure, tests have been conducted at comparatively low Reynolds numbers close to the critical region, but even these failed to reveal such a dependence. Tests will have to become vastly more accurate before any minor dependence on the Reynolds number can be detected.

There is another much more formidable reason why Reynolds numbers are incapable of influencing the solids-laden flow to any marked degree. It seems obvious that the greatest variation in the pressure drop must occur when the mode of transport changes from that shown in Fig. 1a to the one in Fig. 1b. This depends on the velocity distribution curve and can be obtained, all other variables remaining the same by decreasing the pipe diameter or by increasing the velocity (velocity head). Pipe diameter and velocity head have opposite effects so that the change of mode must depend on a variable involving the ratio D/h. This precludes the use of the Reynolds number because in this criterion pipe diameter and velocity have the same effect. Reynolds numbers can be increased by increasing either the pipe diameter or the velocity.

A dimensionless variable involving the ratio D/h has already presented

itself in the derivation of the pressure drop equation (Eq. 9), for extremely fine materials in vertical lines. This is the variable $\gamma D/h$.

RECENT INVESTIGATIONS

When test data are plotted, for instance the specific pressure drop on the specific loading base, the plotted points can be connected by a single curve provided there are no other variables. If there is only one more variable (in this case the ratio h/t) there exists an infinite number of curves, each one of a different but constant parameter h/t. In case tests are conducted in such a manner as to yield groups of points, each group with a constant parameter, then determination of the underlying law is simple.

Unfortunately in the tests that the author has re-examined, there are hardly two points of the same parameter. As a rule, if a curve touches one point it must dodge all others. Even worse, we have to deal not with one but with two independent parameters. Finding the true underlying function under such circumstances becomes frightfully expensive and time-consuming labor, and can never yield very accurate results.

For a correlation of the results obtained by different investigators the pressure drop equation, Eq. (10), is used for horizontal as well as vertical pipes. It might be more consistent to add for a vertical line the number representing the static pressure drop, $\gamma_\infty D/h$. Unfortunately, however, determination of γ_∞ would have to be based more or less on assumption. The pressure drop should be measured at a point far removed from the entrance of the material, or the pipe bend, so as to be reasonably sure that the slip velocity equals the terminal velocity. The uncertainty is avoided by the use of Eq. (10) for both horizontal and vertical pipes. Unlike in the special case of Fig. 1c, the difference in the total pressure drop between vertical and horizontal lines is far greater than could be accounted for by weight of the solids laden fluid column in a vertical line.

Investigators who have followed the example of Gasterstädt in using the ratio of mixture pressure drop, to air pressure drop, seem to have to contend with a considerable source of error. The air pressure drop in the short test pipe used is exceedingly difficult to measure with accuracy. The friction factors determined from Vogt and White's measurements differ easily by ±7 percent, yet they leave no doubt that a hydrodynamically smooth pipe was used for which the friction factor is accurately known. Results of a re-examination of the test data in accordance with Eq. (10), as shown in the accompanying table, differ from those obtained by Vogt and White. Particularly in the case of wheat it was found that they are an excellent confirmation of Gasterstädt's and of Segler's data in that a linear relation exists between specific pressure drop and specific loading. Vogt and White's figures for a horizontal line, however, are much lower than Gasterstädt's (factor b). This must be attributed to the smaller pipe size used, the variation in the group $\gamma D/h$. It is highly probable that the mode of transport changed from that shown in Fig. 1a in Gasterstädt's to Fig. 1b in Vogt and White's case. The test points of sand show considerable scatter so that the coefficients determined cannot claim accuracy.

Results presented by Hariu and Molstad, who show a linear relation between specific pressure drop and specific loading, are at variance with those of Vogt and White and of Belden and Kassel. This, however, should occasion no surprise as the reason for this is not difficult to find. Hariu and Molstad assumed that the Fanning friction equation applies to the pressure drop caused by the material and thereby assumed a linear relationship. The results therefore represent theory, not observed facts.

Belden and Kassel's figures are apparently of greater accuracy, or at least greater consistency. They permitted determination of the dependence of the pressure drop on one more variable, the parameter $\gamma D/h$. Moreover, dependence of the factor b on this parameter seems to agree very well with Gasterstädt's and with Vogt and White's figures for wheat. The great difference in the pressure drop as measured by Gasterstädt and by Vogt and White is thereby fully explained.

The author can confirm Belden and Kassel's findings that the pressure drop is nearly independent of the ratio of pipe to particle diameter.

It should be noted that the ratio h/t sometimes falls below one, as the table shows. This is an apparent contradiction, for if the fluid velocity is less than the terminal velocity the particles will fall down instead of rising. Belden and Kassel have encountered a similar idiosyncrasy is that their friction factor frequently became negative. But this is exactly what should be expected when it is considered that the actual conveying velocities (see Fig. 1b) are greater than the mean fluid velocity on which the formulas are based. The particles are mainly carried by the peak of the velocity distribution curve in the central portion of the pipe.

There is some doubt regarding Belden and Kassel's exponent n, which differs considerably from Vogt and White's exponents. To a certain extent, Belden and Kassel may have done the same thing Hariu and Molstad did. They may have assumed a linear relation between specific pressure drop and specific loading by using in their computation a generalization of the Fanning equation.

The exponent n is apparently some kind of function of the ratio h/t. For h/t close to unity the exponent equals 1.0, while for higher h/t the exponent becomes far less than unity. For $h/t = \infty$ the exponent becomes 1.0 again.

Leonard Farber used material of varying particle size in his tests. Interpretation of these tests may be even more difficult than those conducted with uniform particle size or particles of approximately the same terminal velocity.

Although the material presented in the latest works on the subject constitutes a notable advance toward formation of a scientific basis for pneumatic conveying, particularly where the observations are presented unadulterated by theoretical manipulation, the data so far published are insufficient to permit final determination of coefficients and parameters of the general pressure drop equation. Much less is it possible to formulate design procedures on the strength of published data. The statement made by Vogt and White that the data in the literature and the method of design recommended are of dubious reliability for general use still holds true.

On the other hand, years ago authorities went on record as stating that the underlying mechanics of pneumatic conveying are so complex that it would never be possible to embrace them in a comprehensive theory. Moreover, manufacturers once were actually of the opinion that they were able to "push" material through a pipe line statically, just as compressed gases push a piston in an engine. Considering these things, it is clear that the progress made is remarkable.

REFERENCES

1. Gasterstädt, J., Ver. deut. Ing. *Forschung* 265 (1924).
2. Segler, W., Wiebold Co., Mannheim (Ger.) (1934).
3. Vogt, E. G., and White, R. R., *Ind. Eng. Chem.*, **40**, 1731 (1949).
4. Hariu, O. H., and Molstad, M. C., *Ind. Eng. Chem.*, **41**, 1148 (1949).
5. Belden, D. H., and Kassel, L. S., *Ind. Eng. Chem.*, **41**, 1174 (1949).
6. Farber, Leonard, *Ind. Eng. Chem.*, **41**, 1184 (1949).

Editorial Viewpoints

SIDNEY D. KIRKPATRICK and Staff

A Sound Patent Plan

President Truman has established by executive order a Government Patents Board which is directed to draft regulations for the effective application of a new patent policy. As delineated by the President, this marks an important step in promoting proper relations between industry and government with respect to the inventions of federal employees.

In the past the governmental departments and agencies have had widely varying policies in respect to the rights of the government and the rights of the individual inventor whose patent has come as a result of governmental employment. The new policy makes it clear that such inventions in the future will belong to the government and thus become available for the free use of the taxpayers who have paid for the work. Only when it is evident that neither the government nor the public has any important interest in an invention will the individual patent owner have the right of private development and exploitation.

For more than twenty years this magazine has advocated such a policy. In a number of cases we have exerted our influence to prevent the private development of governmental work in such a manner as to require industry to pay again for rights which morally belong to all of the public, since they have been secured with public funds.

The new Executive Order represents an important step in the right direction. We trust that the new board and its chairman will draft sound regulations for its application. If such regulations are firmly and fairly applied, everyone will gain in the long run.

Chemicals vs. Manpower

More opportunities for chemical service to agriculture are becoming evident as knowledge increases in the proper use of herbicides. One very important step can now be taken through the use of methyl bromide, as a result of fundamental work done at the Mississippi Experiment Station in cooperation with the U. S. Department of Agriculture.

Substantial progress had been made in weed control in the cotton fields. But just as long as complete control was not achieved, the great problem of hand or machine cultivation remained. Now it appears that even the most resistant weed, nut grass, may be controlled by proper application of methyl bromide as a supplement to careful spraying with 2,4-D for broadleaf non-grass nuisance plants.

As pointed out by the department, the use of methyl bromide is not too cheap, nor is its proper application altogether simple. For example, it is necessary to apply about 1 lb. of the chemical to each 100 sq. ft. of spaded soil with the applications repeated at suitable intervals. Furthermore, fully effective results are had only when the treated soil is covered with building paper and the weather conditions and soil temperatures are favorable. This suggests that at least the first uses will be limited to gardens and other intensively worked plots. Nevertheless, the new results give important impetus to weed control.

Chemical manufacturers sometimes complain that their markets are often severely restricted so that mass production is not feasible. Here is a case in which the mass market cries for new chemical services. Insect control, rodent control, and half a dozen other varieties of pest control are probably equally attractive opportunities for chemical manufacturers. These markets are not easily established, nor should they be entered casually or carelessly. To companies that will really take the trouble to be right, they offer opportunities thus far unrealized by anyone. Whenever we can use chemicals instead of manpower, we are rendering a substantial public service and may reasonably look to large and profitable markets.

Britain's Brave Plans

Two years ago the Machinery and Allied Products Institute of Chicago issued a provocative pamphlet entitled "Technical Stagnation in Great Britain." Its somewhat debatable premise was that Britain had failed to re-equip her once modern plants, that management had resisted technical innovation and substituted cartel controls for expanding production and efficiency. That indictment, at least as far as the chemical industry is concerned, now loses force as the result of a remarkable report just issued by the Association of British Chemical Manufacturers. Its pattern of progress is one that can be studied with profit by all of us.

Sir Frederick Bain, vice chairman of ABCM and deputy chairman of the Imperial Chemical Industries, ably analyzed this report in his recent address to the American Section of the Society of Chemical Industry. The volume had its origin more than a year ago when the president of the Board of Trade asked that a com-

prehensive survey be made to determine the present status, long-term plans and probable trends of development likely to have bearing on the forward progress of the British chemical industry. Despite the ramifications and unparalleled complexity of the field, the association did a remarkable job in presenting the history and achievements of the chemical industry, its problems and policies of national and international interest.

Americans, we judge, will be most interested in the three concluding chapters on plans for expansion of the industry, difficulties being met in completing the new projects and, finally, the five-year forecast of what all this means in terms of imports and exports. The master "Summary of Forward Plans" shows that total annual capacity is scheduled to mount from 9,846,440 tons valued at £347,439,000 to an ultimate output five years hence of 14,231,021 tons valued at £570,471,000. This expansion will require 25,000 additional employees, will decrease imports by £28,359,000 per year and increase annual exports by £47,138,000.

Largest cuts in imports will be in heavy organic chemicals, inorganic acids and salts (including carbide) and chemical fertilizers. Export pressure will also be put on these raw materials as well as on more advanced products such as pharmaceuticals, plastics and dyestuffs. Reference is made in the report to the possibilities of increased dollar earnings from "licensing under patents and the sale of know-how" particularly in the U.S.A.

Most serious among the limiting factors in this program is the present scarcity of scientific and technically trained personnel. In 1948 the industry employed about 6,000 chemists, but by 1953 at least 8,400 will be required. Chemical engineers, physicists, pharmacologists, biologists and mathematicians are in even shorter supply and are likely to remain so for several years to come.

Our British brothers are to be commended for the courage of their vision and the clarity with which they have portrayed the role their industry can play in the national economy. We can agree with those responsible for this report, that "The national purpose will best be served by the utmost freedom of enterprise," and that only under such a competitive system can these brave plans bear full fruit.

Argument—or Alibi?

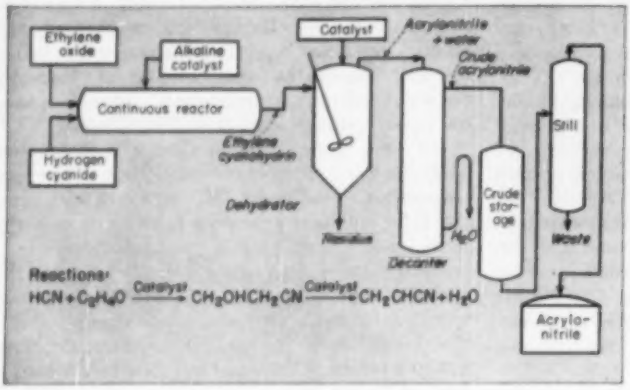
In 1879 a group of Englishmen headed by Professors Roscoe and Thorpe, E. K. Muspratt, J. Hargreaves, Ludwig Mond, and George E. Davis met in Manchester in an unsuccessful attempt to form "a society to promote the application of chemical science to manufacture and the acquisition of that species of knowledge which constitutes the profession of a chemical engineer." Seventy years later in the same city, the 68th annual meeting of the Society of Chemical Industry heard the distinguished past president of the Institution of Chemical Engineers, H. W. Cremer, C.B.E., present a soul-searching paper entitled "Chemical Engineering—Fact or Fiction." Such is the irony of history that in what might have been the official birthplace of our profession, its followers were still arguing the difference between "a sort of qualitative mixture of applied chemistry and mechanical engineering" and a new type of engineering study "calling for that quantitative compounding of chemistry, physics, metallurgy and engineering" required to meet the rapidly growing needs of modern industry!

To the lasting credit of George E. Davis, who wrote the first comprehensive "Handbook of Chemical Engineering" based on his 1887 lectures at Manchester and Liverpool, there were a few followers to carry that torch—or in Cremer's words, "a devoted minority (a group of fanatics some regarded them) to ensure that chemical engineering had even a local habitation and name" in England. One who helped immeasurably in that process was the late Kenneth B. Quinan, the American-born citizen of the world and chemical engineering hero of World War I. "K.B.Q." (as he was always known to his colleagues) was the catalyst that promoted the formation of the Chemical Engineering Group of S.C.I. in 1918, from which developed the official qualifying organization, the Institution of Chemical Engineers, in 1922.

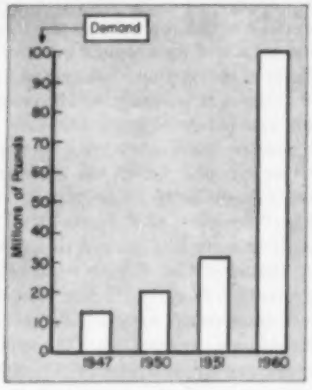
But Britain's problem is not one of societies and organizations. It lies deeper in the traditions and characteristics of her professional people. And in these parlous times when chemical engineering leadership is sorely needed, England is fortunate in having the fighting sort of evangelism that has come from Herbert Cremer's fruitful experience both in education and in industry. "The hour is late, very late, but there is yet time to make good if only all interested parties (and there are so many of them) will cease arguing and get on with the good work." Is there not a lesson here?

"For Dear Old Maine"

Loyal men of Maine, by song and deed, have done much to spread the fame of their alma mater in the pulp and paper industry. Theirs was the first school in America to undertake university training in this specialized technology. Now after forty years of service to that field, its leaders are helping to launch a new University of Maine Pulp and Paper Foundation. Their first objective is to step up the training program by providing scholarships, research grants and improved facilities for both instruction and research. The ultimate goal is to attract and develop outstanding technical men for important responsibilities in management and supervision. Professor John B. Calkin, director of the university's department of industrial cooperation at Orono, has the facts and figures to prove that an investment in this program will pay dividends not only to the pulp and paper industry but to all its chemical engineering allies.



HOW IT IS MADE by its sole producer, American Cyanamid.



HOW MUCH will be needed.

Commodity Survey:

ACRYLONITRILE

Synthetic rubber is taking the bulk of current output. Synthetic fibers are growing fast.

Acrylonitrile is a chemical with a promising future. Its structure makes it an ideal chemical building block. During the war it did yeoman service with butadiene in nitrile rubbers. Now it is finding vast and new markets in the synthetic fiber industry. This commodity survey is a round-up of information which will give *Chemical Engineering* readers a look at the current status of the chemical and its chances for future expansion.

Chemically it is vinyl cyanide (CH_2CHCN). Physically it is a clear white liquid (but technical grades may be slightly yellow). It is a flammable poison and is handled with respect.

WHO MAKES IT? HOW MUCH?

At the present time there is only one domestic producer. American Cyanamid Co. makes it at Warners, N. J. In the war years Rohm & Haas Co. produced about 6,000,000 lb. per year, but they stopped making it at the end of the war and to date have shown no inclination to resume operations. Du Pont did make some on a pilot plant scale, but they are not producing it at the present time. In 1942 their production was about 200,000 lb. Cyanamid developed commercial output of the chemical in their Stamford, Conn., unit. In 1939 they initiated the first commercial domestic production. They have pushed its output up to current levels by steadily expanding capacities and markets. Capacity is now 28,000,000 lb. per year. This increase was brought in during 1948. Previous capacity was about 13,200,000 lb. Within ten years the demand for acrylonitrile should push annual capacities above the 100,000,000-lb. mark. Some feel that the ultimate demand for it will be at least 300,000,000 lb. per year. However, this year's annual production rate will be about 20,000,000 lb. Before 1952 there will probably be enough demand to warrant a further increase in capacity, according to trade sources.

WHERE IS IT USED?

Last year about 8,516 long tons of nitrile rubber was made. Assuming that the acrylonitrile content ranged from 25 to 40 percent, the use in this market last year was between 5-8,000,000 lb.

While polyacrylonitrile synthetic fiber production is still in its infancy, Du Pont and Carbide are producing fibers of this type. Du Pont is making it on a pilot plant scale at Waynesboro, Va. A full-scale commercial unit is being built at Camden, S. C. This plant will produce about 6,000,000 lb. of orlon—trade name for Du Pont polyacrylonitrile fibers—in the first year of its operations. The plant will go on stream late this summer. When the plant is finished, Du Pont's research and plant investment in orlon will be more than $22,000,000.

MORE FIBERS?

Carbide and Carbon Chemicals Corp. is also making an acrylonitrile type fiber in yarn and staple form. Their fiber is an acrylonitrile-vinyl chloride type copolymer—the yarn is called Vinyon-N, while the staple was recently christened Dynel (See *Chemical Engineering*, Dec. 1949). Dynel will be available in commercial quantities when the current expansion of Carbide's unit at South Charleston is completed this spring. The new facilities will be operating before June.

Chemstrand is another potential fiber on the horizon. Dr. C. A. Hochwalt, is president of Chemstrand Corp., jointly owned by Monsanto Chemical Co. and Amer-

(Continued on page 293)

How Girdler Moved an Ammonia Plant

Bad weather complicated the problem, but the engineers used know-how and hard work to move an 80-ton-per-day ammonia plant from Louisiana, Mo., to San Jacinto, Tex., and get it running again.

E. H. FRENCH and J. D. WILSON

Moving heavy equipment even a short distance is no easy task. But it is child's play compared with the engineering skill and resources necessary to disassemble a major manufacturing establishment, transport the outsize components hundreds of miles, and restore it to efficient operation.

The 70-80 ton-per-day synthetic ammonia plant at the San Jacinto Ordnance Depot, near Houston, Texas, is an interesting example of such a large-scale undertaking in the chemical field. The two synthetic ammonia trains now at San Jacinto were moved from Louisiana, Mo., to the present site by Girdler Corp. of Louisville, Ky.

The facilities to be moved were in two gas production areas, two compressor areas, two purification areas, two causticizing areas, two synthesis areas, and one storage area.

The moving procedure planned by Girdler's engineers included a code system for identifying and accounting for the thousands of individual pieces of equipment involved. Numbers and letters painted on the pieces in bright orange and correspondingly identified on blueprints before dismantling, greatly expedited the re-erection phase of the project.

In keeping with prudent engineering practice, it was anticipated that numerous problems and obstacles would arise as the work advanced, and proper provisions were made to resolve them. But not foreseen were the drastic climatic conditions that were met, and eventually overcome.

DISMANTLING

When the dismantling phase of the undertaking was begun, during the first week of December, 1948, the engineers were immediately faced with the first of many prolonged stretches of abnormal weather. Missouri was hit by one of the worst sleet storms in twenty-five years, and all outside activity was brought to an abrupt halt. For days little could be accomplished. Later, snow fell and remained for weeks, hiding many dismantled small parts.

The ice, snow and cold brought about a sharp revision in dismantling plans. Equipment within the various structures was handled months ahead of schedule, while other items were left for better weather. Lack of sufficient storage space during this period made it necessary to ship vessels, pumps, motors, and certain structural members to San Jacinto earlier than they were needed there.

But despite the hazardous conditions underfoot and the generally rigorous winter, the work was pushed forward rapidly.

The task of applying code numbers to individual pieces of equipment and parts, referred to earlier, was not without complications. Persistent ice and snow had to be cleared from the surfaces to be stenciled. And it was necessary to identify with painstaking accuracy the components of seven almost identical pairs of structures in each of the two trains of production, and structures connected with both trains. While the major components were coded, and prepared for shipment, small structural and electrical parts also were being marked for easy re-identification.

The large number of valves and flanges used in the piping systems were protected during transit by wooden covers, firmly bolted in place. The moving parts of pumps and the critical parts of other pieces of apparatus were guarded by a rust inhibitor and special crates.

The network of piping was taken down in sections, and cut within the limits of length and width prescribed by railroad regulations. Both sides of each cut were match-marked to facilitate reassembling. The dismantling of the piping was planned with care, so that a minimum of labor would be expended and each car would carry as much tonnage as possible.

Furnace shells were quartered and

E. H. FRENCH and J. D. WILSON are with the Gas Processes Division of the Girdler Corp., Louisville, Ky.

PROCESS HISTORY

Long ago Hercules Powder Co. developed a combined catalytic reforming and CO conversion process for reacting natural gas, flue gas and steam to give directly an ammonia synthesis gas, free of nitrogen oxides, of the correct N_2-H_2 proportion, and containing less than 0.5 percent CH_4. Hercules arranged with L'Air Liquide Societe, and Societe Chimique de la Grande Paroisse, of Paris, France, to design for it an ammonia synthesis system, to operate with 20 percent to 30 percent CH_4 content in the circulating system, and with no purification of the reformed and converted gas other than the CO_2 removal step and the conversion of residual CO to CH_4. This plan eliminated expensive steps previously used for obtaining substantially pure N_2-H_2 mixture.

The first plant to be built incorporating the Hercules reforming process and its ideas of a high CH_4 content synthesis circulating system was placed in operation at Hercules, Calif., in 1940.

The results were so satisfactory that in 1941 the government contracted with Hercules for a plant of similar design at the Missouri Ordnance Works, Louisiana, Mo. The plant was completed in 1942 and used throughout World War II, and for a short period in 1946-47. Operations at the Missouri Ordnance Works have since been suspended. The property has been acquired by the U. S. Bureau of Mines for its synthetic fuels program.

WHY THE PLANT MOVED

The transfer of title of the Louisiana property to the U. S. Bureau of Mines, the lack of an adequate supply of low-cost natural gas, and other considerations, resulted in the Army's decision to move part of the ammonia facilities to San Jacinto. Hercules was named the prime contractor and will operate the San Jacinto Ammonia Works. The Girdler Corp. was selected as the sub-contractor for the dismantling, crating, transportation, and re-erection of the equipment. As the accompanying article relates, they had their troubles.

nested for shipment. The furnace stacks, each 125 ft. high, were cut in three pieces and match-marked.

Certain storage tanks had to be cut into four pieces for transit. Other storage tanks, 80 ft. long, required three flat cars, one car bearing the load with an idler at each end.

The boiler house, water treatment plant and all of the gasometers remain at Louisiana, where they are used by the Bureau of Mines. Also left behind were a number of buildings of brick, concrete or wood construction that could not be advantageously moved.

TRANSPORTATION

The facilities at Louisiana were moved to San Jacinto entirely by rail. Barge and rail-barge transportation were thoroughly considered, but rejected because most shipments were made during the winter, when the Mississippi is closed to traffic north of St. Louis, and early spring, when ice floes sometimes impede river craft. A total of 180 railroad cars of various types were employed in hauling 4,500 tons of equipment to San Jacinto.

Due to the weather conditions at Louisiana, which necessitated reshuffling of the dismantling schedule, and other factors, six or more loaded cars frequently arrived at San Jacinto simultaneously, taxing the storage space available. This problem, aggravated by long rainy periods, was later eased through the use of government freight cars, which were left loaded and stored in the classification yards of the San Jacinto Ordnance Depot until needed.

A 16-car train was required to transport five anyhydrous storage tanks, B-Liquor storage tanks and a number of other vessels. The loading operation and the bulkiness of the cargo caught the eye of the local press, and served as subjects for newspaper stories and photographs.

The last piece of equipment loaded at Louisiana reached the San Jacinto site on June 15, 1949.

ERECTION

While one of Girdler's field groups was dismantling the facilities at Louisiana and starting them on the way to Texas, another group cleared the site at San Jacinto, laid the foundations for buildings and equipment, and began the re-erection phase of the job. (Some 200 new drawings were required to supplement approximately 600 drawings employed by Hercules when the facilities were orginally set up.)

Since the plant is located in the Gulf Coast Hurricane Belt, it was necessary that all structures be rechecked to determine the amount of windload they could bear, and strengthened where required.

A topographical survey, made preliminary to the construction activities at San Jacinto, revealed that a deep drainage ditch traversed the premises, and that a 12 in. water main lay beneath the sites that had been tentatively selected for a number of structures. These obstacles were overcome by re-routing the ditch and laying subfoundations over its original path, where necessary, and by making some revisions in the layout that was at first proposed.

In San Jacinto, as in Louisiana, bad weather was a serious obstacle. Not only was the area visited by the wettest year in fifteen, but during the summer months the temperature and humidity reached extraordinarily high levels, once soaring above the highest point ever recorded by the nearby Houston Weather Bureau office.

Rain fell almost continuously during the winter, summer and early fall months. This extremely wet year was climaxed by a hurricane which hit on October 3 and shut down all construction activities completely for a week; 17½ in. of rain fell during this week, the heaviest in the history of Houston for a similar period since 1878. After these heavy rain falls, the only vehicles that could move under their own power were bulldozers and jeeps. In time, traffic through the steadily deepening mud turned it into a quagmire. Hundreds of cubic yards of slag finally provided some traction, but the passage of 12-ton concrete trucks and other heavy vehicles over the road material ground it out of sight in a short time. Large quantities of slag had to be continually added for a roadbed wherever temporary roads were traveled.

Newly excavated footings and foundations also suffered from the incessant rain, although they received the protection customarily provided under such circumstances. A number of excavations filled up and reinforcing steel sank into the mud. As the abnormal rain kept up, time and materials were saved by laying a 4 in. concrete seal on the bottoms of the excavations.

Each of two compressor buildings at San Jacinto houses an Ingersoll-Rand hyper-compressor, which operates at a discharge pressure of 15,000 psi. It was imperative that the compressors be securely anchored and the Foundation Co. called in for consultation. Borings were made to determine the sub-surface characteristics of the ground at the two locations which are only a few feet above sea level. It was found that ordinary piling, which is normally used in such cases, would not be adequate in this instance.

The Foundation Co. recommended and designed a rectangular caisson of concrete reinforced steel for each location. Each caisson is 24 ft. wide and 40 ft. long with 6 ft. thick walls, and is divided into two compartments by a 6 ft. thick bridge wall. The caissons were sunk to a depth of 38 ft. before satisfactory bearing was reached. The walls of the caissons were poured in sections 6 ft. high, and slowly sunk to the proper depth merely by the removal of earth, picked up by a clam shell bucket from within the areas formed by the compartments.

After the caissons had been sunk, the exact condition of the bottoms of the two excavations was determined. The examination was carried out by a deep sea diver, brought inland for the assignment. Once the condition of the bottoms had engineering approval, they were sealed with a 10-in. pad of concrete. A total of 1,500 cu. yd. of concrete was poured for each caisson. The actual compressor foundations were then poured on the caissons.

While the re-erection work proceeded at San Jacinto, Girdler's purchasing department in Louisville handled the acquisition of the many items which could not be moved from Louisiana, or were needed for replacement or other purposes. Involved in the job was the tedious sifting of the great number of purchase orders issued by Hercules when the plant was originally constructed, in order to find the quality and quantity of the material used. New items purchased ranged from small gaskets and bolts to carloads of firebrick, structural steel, pipe, boilers, stacks and gasometers.

At the start of the project, Girdler's engineers prepared a progress chart, which was revised weekly. Duplicate charts in Louisiana, San Jacinto, Washington, Wilmington and Louisville kept field crews and management men closely posted on both the dismantling and re-erection operations, and eliminated a great deal of lost motion, correspondence and delays which might otherwise have occurred.

The work at San Jacinto is now complete. Both ammonia trains are being operated by Hercules Powder Co. helping to provide fertilizer for our foreign aid program. The dismantling, moving and re-erection work has been an interesting assignment, and the cooperation received by Girdler from both the Ordnance Department and Hercules aided immeasurably in speeding up and simplifying the job.

When and How to Line Process Vessels With Stainless Steel

When is a stainless lining cheaper than stainless-clad or solid stainless? What welding method gives best results for its money? What are the pros and cons of each technique? Here are answers to these and other key questions on lining with stainless. It is the first time this information has been brought together in a unit.

R. G. SLOAN, Jr.

Stainless steel-lined storage and processing vessels are widely used in the chemical, petroleum, pulp and paper and other process industries. From experience, I know that engineering, operating and purchasing men in these industries ask a lot of questions about stainless linings. Here are my concise answers to the more common ones.

"When should I use stainless linings in my equipment, both old and new?"

For existing equipment the answer is easy: (1) balance the estimated cost of lining against the cost of a new vessel; (2) prorate each over a reasonable period of life expectancy. This assumes the equipment is not so badly corroded that it cannot be lined. Lining has often proved economical. The life of carbon steel vessels threatened with destruction by corrosion has often been greatly prolonged.

The problem is more complicated in new equipment; careful study must be given to selecting the most economical type of construction for satisfactory service. Solid stainless, stainless-clad or stainless lining are three possibilities. Initial cost of each must be considered in the light of individual requirements. It is impossible to develop a general formula for calculating construction costs for all vessels, using any of the three types of construction. This is because of the wide variations in design, size, quantity of material, number and type of fittings. Each type of construction has a field in which it is satisfactory and probably the least costly of the three. Yet there are areas of economic overlap which complicate the choice.

R. G. SLOAN *is an engineer in the development engineering department of Armco Steel Corp. at Middletown, Ohio. He has had a lot of experience with design problems and use of stainless steel in the chemical process industries.*

When Wall Thickness Is . . .

. . . 0.25 in. or under, solid stainless is usually most economical.
. . . 0.25 to 0.5 in., solid stainless and stainless-clad are often competitive; make a careful cost comparison.
. . . 0.5 to 1.0 in., stainless-clad and stainless lined are often competitive; make a careful cost comparison.
. . . 1.0 in. or more, stainless lined is usually most economical.
. . . 0.75 in. or below and conditions are severely corrosive, solid stainless is often used.
. . . 0.75 in. and above and conditions are severely corrosive, either clad or lined construction should be considered.

Many fabricators believe that solid stainless is usually less expensive and more satisfactory than stainless-clad when total wall thicknesses do not exceed 0.5 in. Others believe the dividing line is at about 0.25 in.

When heavy wall thickness is required, lined construction should be considered. There seems to be general agreement that in wall thicknesses over about 0.75 in., lined construction is usually less expensive than clad; yet some fabricators feel that the dividing line should be about 1 in. Those who use patented methods of spot welding believe they can build a lined vessel at lower cost than by the strip or plug welding methods. This would indicate that spot welded linings would often be less expensive than clad when wall thicknesses are 0.625 in. and over—or perhaps 0.5 in. and over.

Where conditions are severely corrosive, thickness of the stainless is a major factor. In such cases, if the wall thickness required for structural purposes is under about 0.75 in., solid stainless usually gets the nod. Cost of solid construction over 0.75 in. is often prohibitive, even under extreme corrosion conditions. Clad or lined construction is then used. The thickness of stainless on clad material over 0.75 in. total thickness is sufficient for most of these highly corrosive conditions. Thickness of lining material can be increased as desired.

The foregoing table sums up our ideas. These opinions, general in nature, are not necessarily applicable to a specific job. Sometimes new vessels are lined in the field. This is more costly than lining in the shop and may change some of the general conclusions just given.

"How do I prepare my vessel for the lining job—and why?"

Here are the steps: (1) provide detailed engineering drawings; (2) plan the procedure; (3) get the proper equipment and trained men. These steps are important when a vessel is built or lined in the shop; they are more important when lining is done in the field for either new or existing equipment.

As soon as the lining materials and methods are chosen, give attention to the steps in preparation. These steps are discussed in detail in the following sections.

Provide Engineering Drawings—This may be done from drawings of the shell in the case of new construction, but should be based on actual measurement when old vessels are to be lined. Drawings should be detailed. Give attention to size of sheets or strips; size and spacing of holes (when plug welding is used); details around openings, fittings, baffles and trays (an unbroken stainless surface must be presented); size and shape of strips to be used in conical, hemispheric or parabolic heads. Various layouts such

as orange-peel or pie-shaped strips have been used in lining shaped heads.

Lay Out Shaped Pieces and Holes—Cut out, then punch or drill holes. Shaped pieces for new vessels may be cut ahead of time. With old vessels that may be somewhat irregular in shape, it is wise to delay cutting until the welders are ready for the pieces.

Specify Welding Methods—Here is a table that gives electrode size, welding current and speed for use in lining with any of the chromium-nickel types of stainless steel.

What Electrode Size and Welding Current to Use

Thickness of Liner, In.	Electrode Diameter, In.	Welding Current, Amp.	Arc Speed, In. per Min.
Horizontal-Downhand			
1/16	3/32	65	13-15
	1/8	90	15-17
1/8	1/8	90	12-14
	5/32	125	15-17
3/16	5/32	125	9-11
Vertical & Overhead			
1/16	3/32	50	6-8
1/8	1/8	65	5-7
3/16	1/8	80	4-6

Values in this table are not intended as hard-and-fast rules. They should be used as guides; the welder supervisor should order or permit variations that give the best results for each welder. These values will differ slightly with different types of beads such as root beads that join stainless to mild steel and cover or fillet beads that join stainless to stainless. It is important to use the lowest current that will give proper penetration; speed should be adjusted to give soundness and fullness of bead. If the welders on the job are highly skilled, they can use the larger electrode size shown for each lining thickness, thus weld faster and more economically. Otherwise, the smaller electrode sizes should be used, sacrificing some speed for better assurance of sound welds. Since close control is important, the welding machines should not have much greater capacity than the job requires. Machines of 150 amp. are suitable for most lining jobs.

It is wise to carefully instruct welders and to require them to practice welding the materials in all positions to be met with on the job. The welding supervisor should impress upon his men that it is necessary (1) to attach the lining securely to the shell at all points along the welds and (2) then to seal each plug or bead to prevent leakage.

Prepare the Shell—A clean steel surface must be presented for welding. There must be no rust, scale, old paint, aluminum coatings, grease, oil, dirt or other foreign material on the inner surface. In new construction, normal cleaning methods should be satisfactory. Sand or shot blasting is probably the best and most economical method with old vessels; it is often used on new vessels. Crushed flint-type sand is most effective in blasting.

Hold the Lining Snugly—Here is a simple way to hold the lining snugly against the shell while welding is under way; cut a heavy timber a little shorter than the vessel diameter, place one end against the lining material, hammer the other end off center. Timbers or tubing with light jacks attached are also effective.

A spider with 6, 8, 10 or more radial arms is slightly more complicated. But it will hold in place a full course of strip lining or several complete rows of holes for plug welding. Lengths of tubing welded to a steel hub make a good spider that is not too heavy. Light jacks attached to each arm provide adjustment; a shoe on each jack will help spread the pressure. Vertical positioning is made easy by suspending the spider by a rope or cable from the top of the vessel.

"How can I decide what lining method is best to use?"

Study the pros and cons of the four general methods for lining process vessels: (1) plug welding; (2) strip welding; (3) spot welding; (4) the so-called poke welding. These pros and cons are given in detail in the following sections.

Spot welding methods for shop lining of new construction are used by several fabricators and have been quite successful. Since these are patented they will not be discussed here. Operators considering new construction may want to ask these fabricators for complete information on the shop-lined vessels they can supply. New portable spot-welding equipment for use in the field is reported to be successful, especially when the vessel interior is new and smooth. This equipment is also patented.

A recently developed "poke welding" gun, making use of the inert gas-shielded arc principle, may have good possibilities. The gun fusion-welds two lapped pieces of metal without the necessity for making holes in either piece. It is applied to only one side of the joint. The weld resembles a resistance spot weld and is said to have similar properties.

The two pieces being welded must be in intimate contact; great pressure is not necessary as with resistance spot welding. Jigs probably would provide enough pressure between liner and shell for satisfactory use of poke welding. Thicknesses of stainless liner through which the gun will weld are 0.0625 in. maximum in the vertical and overhead positions and 0.125 in. maximum in the downhand position. The method may not be too satisfactory for lining badly corroded vessels that have markedly rough interior surfaces. Costs are said to range between 6-12 mils per spot. The equipment is patented but can be purchased commercially.

"Can you give me more details on how to line my vessel by plug welding?"

Here they are, treated under two broad headings: (1) how to punch and drill on proper centers; (2) how to attach to the shell by plug welding through the holes.

Sheets of any size may be used; in closed vessels, size is obviously limited by the size of the largest opening. Base widths for stainless sheets are 24-36 in. inclusive and base lengths are 60-120 in. inclusive. Extras are charged for larger sizes, but less edge welding is required which often more than offsets the size extras. The cost of sheets in larger sizes should be compared with the cost of standard size sheets plus the cost of extra edge welding required on the standard size sheets. Consider strip widths (under 24 in.), since strip prices are lower than sheet prices.

Sheets may be cut and formed to fit the interior contours of the vessel; this is usually unnecessary except in irregularly-shaped areas or in shaped domes. Jigs will assure proper fit with liners of usual thicknesses on regularly-contoured areas.

While there are no definite rules for spacing of holes, here is a summary of the usual practice:

How Far Apart to Space Plug Welds

Operating Temperature, Deg. F.	Distance Between Centers, In.
950-1,000 or over	2.5
850-950	3.0
750-850	3.5
450-750	4.0
Under 450	Up to 6.0

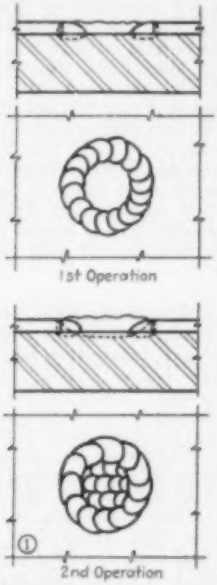
Spacing up to 6 in. has been successful on open vessels or on those operating under 450 deg. F. Even so, it is considered safer practice to use 4-in. spacing. In vessels operating under vacuum, spacing should not be over 4 in. and 3 in. is preferred. Edge distances should never be more than the distance between hole centers.

Diameter of the punched or drilled holes depends on several factors. Holes under 0.5-in. diameter may cause shorting of the arc; holes over about

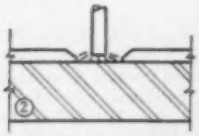
1 in. may cause excessive dilution. Shorting of the arc results in insecure attachment of the liner; excessive dilution reduces corrosion resistance of the weld. If the welders are highly skilled in plug welding, they can "ring" the hole to fasten the liner to the shell and seal the hole at the same time, obtaining a sound weld. In this case, holes should be 0.5-in. diameter for 0.0625-in. thickness and 0.625 in. for 0.125-in. thickness. Any but the most highly skilled welders should first "ring" the hole for fastening the liner, clean out the slag and inspect the hole, then fill or seal the hole in a separate operation, using holes of about 1-in. diameter. Sketch 1 shows this procedure.

Another practice is to use holes of small diameter for a given liner thickness (0.5-in. diameter for 0.125-in. liner thickness; countersink or chamfer the holes (sketch 2) and weld in one operation. This helps insure strong, sound plugs; but it is more costly.

Plug welding should start in the center of each liner sheet and progress to the outer edges in all directions.



Plug Welding



Use of Chamfered Hole

This will minimize locked-up stresses. After all plug welds are completed in one liner sheet, the adjacent sheet is plug-welded and the edge welds are made to join the sheets. Edge welding may be accomplished by any of the methods described under strip welding. Although butt welding methods are often used (particularly that shown in sketch 5) good fit-up is necessary. This requires experience and is time consuming, especially with larger sheets. To make fit-up easier and quicker, a lap method (such as shown in sketch 8) may be used. When considerable experience is lacking, this is probably more economical. Good results are more certain, even though material cost is increased slightly.

Sketch 8 shows a lap of 0.25-0.5 in. for strip welding, but with the larger sheets used in the plug welding method the usual lap is 0.5-1.0 in. Preforming of the edges usually is not necessary with the larger overlap. Both the covered and the exposed edges of lap joints should be continuously welded; any damage due to a leak in one liner sheet will not spread.

"Now what about giving me the details and advantages of strip welding?"

Strip welding utilizes strip 3 in. to about 6 in. wide, each edge of which is continuously welded to the shell. The strips may be laid horizontally or vertically; horizontal courses are usual because of faster and easier welding. Vertical courses are sometimes more convenient near or between fittings. Where wall contour of the vessel is irregular, preforming of the strips is advisable. It is not necessary to roll the strips to conform to a regular surface, but this is sometimes done. Jigs will hold the strips tightly.

Width of strips is rather flexible. Usual practice has been about like this:

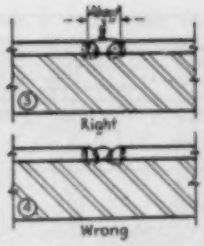
What Width of Strips to Use

Operating Temp., Deg. F.	Width Of Strips, In.
950–1,000 or over	3.0
850–950	3.5
750–850	4.0
450–750	4.5–5.0
Under 450	Up to 6.0

In vessels operating under vacuum, strips should not be over 4.0-4.5 in. wide.

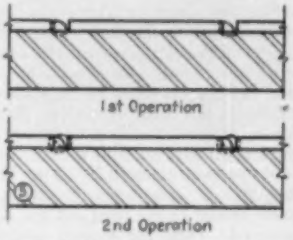
Length depends on convenience of handling on the particular job. It should be over 24 in. since this is the minimum base length in stainless steel strip. Usual lengths are about 4-6 ft.

Many methods have been used in strip lining. All variations fall into two general classifications: butt or lap. Here are the major variations of both:



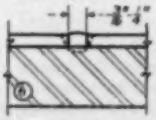
Three-Bead Butt Weld

Strips are tack-welded in place, leaving a gap of about 0.375 in. between edges. Each edge is then continuously welded to the shell. Slag is cleaned from the welds, and the final weld bead applied to completely cover the beads on both adjoining edges. This cover bead should cover the full width of gap between strips as shown in sketch 3. A cover bead that is too narrow (as in sketch 4) invites unsound welds and crevice corrosion.



Two-Bead Butt Weld

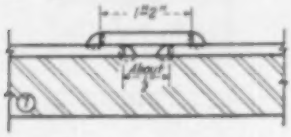
The first course of strip is continuously welded to the shell on both edges. Slag is removed from the weld and bumps from restrikes are chipped to make them even with the rest of the bead. The next course of strip is placed snugly against the first weld and tacked in place. The outer edge of the second course of strip (the edge away from the first course) is then continuously welded to the shell. This is followed by a second bead laid on the joint between the courses, overlapping the first bead. Sketch 5 illustrates this method. If desired, all strips may be placed and their outer edges welded and cleaned of slag before any second beads are laid.



Single-Bead Butt Weld

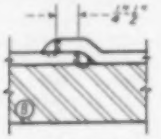
Strips are tacked in place 0.187 to 0.25 in. apart and a single bead attaches adjoining edges to the shell and

seals the joint. This is shown in sketch 6.



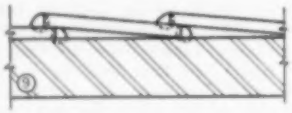
Butt Strap

Strips are placed relatively far apart (about 0.5 in.) and continuously welded along both edges. After the slag is removed, cover straps about 1-2 in. wide are placed over the gaps and continuously welded to the strips as shown in sketch 7.



Lap Weld with Formed Edges

The first course of strip is continuously welded to the shell along both edges and the slag removed. All other strips are formed along one edge so that the edge is offset by an amount equal to the strip thickness. Each course of formed strip is so laid that the formed edge overlaps the flat edge of the previous course 0.25-0.5 in. The flat edge of each course is continuously welded to the shell and the slag removed. Then the formed lapping edge is welded to the previous strip (sketch 8).



Shingle Method

This is a variation of the method shown in sketch 8. Its only difference is that strip edges are not formed (sketch 9).

Careful inspection of all stages makes for better results in lining work. Obviously, the inspectors should have expert knowledge of welding.

"How should I go about inspecting and testing the job at all stages?"

Inspect the vessel after it is cleaned and before welding begins. Every weld bead should be cleaned of slag when completed and inspected as soon as the slag is removed. Weld beads should never be covered by another strip or another weld without careful inspection. This means that in making plug welds in two operations the first "ringing" weld should be cleaned and inspected before the plug is filled in; in strip welding (as shown in sketch 3) the two beads that fasten each joint to the shell should be cleaned and inspected before the cover bead is laid. In 2-bead butt welds (sketch 5) beads made in the first operation should be cleaned and inspected before the cover bead is laid in the second operation. With the butt strap arrangement (sketch 7), the lap weld with formed edges (sketch 8), and the shingle method (sketch 9) the welds that fasten the strips to the shell should be cleaned and inspected before they are covered by the lap or the cover strap.

Inspect all final weld beads immediately after welding and again after the lined vessel is finished by cleaning or blasting. If there is any doubt about soundness at any point in the welds, it is better to reweld at that point.

Linings applied by the plug welding method should be pressure-tested for leaks. Pressure should be applied to each sheet of the liner at the interface between shell and liner sheet. Behind each liner sheet, the shell is drilled and tapped from the outside to take a 0.125-in. pipe nipple. The tapped portion need only be deep enough to carry four or five threads. A smaller hole can then be continued to the interface and air pressure at 2 to 15 psi. applied. A soap suds test over every foot of weld will reveal any leaks.

Strip linings may be tested in this way, yet this is usually not considered economical. Customary practice is to try to detect leaks during final weld inspection by visual means or by tapping the welds lightly with a hammer. In some cases, strip-lined vessels have been filled with water before going into operation, permitted to sit for 24-48 hr., then checked for bleeding of rust at the welds. Although all other tests are made before final surface finishing, this method must be used afterward if rust from weld scale is not to be confused with bleeding from leaks. After welding, inspection and testing, the entire surface of the lining should be thoroughly cleaned. Standard methods of metal cleaning may be used but swabbing with about 50 percent by volume phosphoric acid solution or 15-20 percent nitric acid is recommended. Follow either treatment by a clear water rinse. To be certain that weld slag and discoloration, grease, oil, dirt, and iron particles are removed, sand blasting may be used. Note that the blasting medium should be flint-type sand. NEVER use steel shot on stainless steel. Blasting may be followed by one of the acid treatments.

"Will you briefly compare pros and cons of plug welding with the various methods of strip welding?"

First, understand that all the methods described have given satisfactory results. Because of wide variation in vessel design, operating conditions and skill of workmen, it is impossible to set forth here any definite means of choosing between them for various types of jobs. However, their general advantages and disadvantages may be summed up in this way:

Plug Welding—There has been more experience with plug-welding liners; some authorities prefer the method for this reason. Its chief advantage is probably the fact that it is easier to positively test for leaks. As for standing up in service, both mechanically and corrosion-wise, it has many satisfactory case histories. There is little opportunity for crevice corrosion to occur if the plugs are properly sealed. Many people believe plug welding affords stronger attachment to the shell than the strip methods, but this is not necessarily so. There is probably more possibility of harmful dilution of weld metal in plug welds than in any of the strip methods except the single-bead butt weld. Comparison of plug welding costs with those for strip welding methods is on the order of: 10 to 30 percent more expensive than 2-bead butt weld; 5 to 15 percent more expensive than 3-bead butt weld and lap weld with formed edges; 0 to 15 percent less expensive than the butt strap arrangement.

Three-Bead Butt Weld—Harmful weld metal dilution is not likely if fit-up is good and the cover bead properly laid. Likewise crevice corrosion rarely occurs. Laying of the cover bead, however, is not easy for welders that are less than expert. Fit-up is rather exacting, more so in this method than in any other strip method except single-bead butt weld or the shingle beads are used at each joint, it is more expensive than 2-bead butt weld, single-bead butt weld or the shingle method. It is slightly more expensive than lap weld with formed edges and less expensive than butt strap.

Two-Bead Butt Weld—This probably offers the best all-around combination of freedom from dilution and crevice corrosion, ease of fit-up and moderate cost. Harmful dilution is extremely unlikely; so is crevice corrosion when the second bead is properly laid.

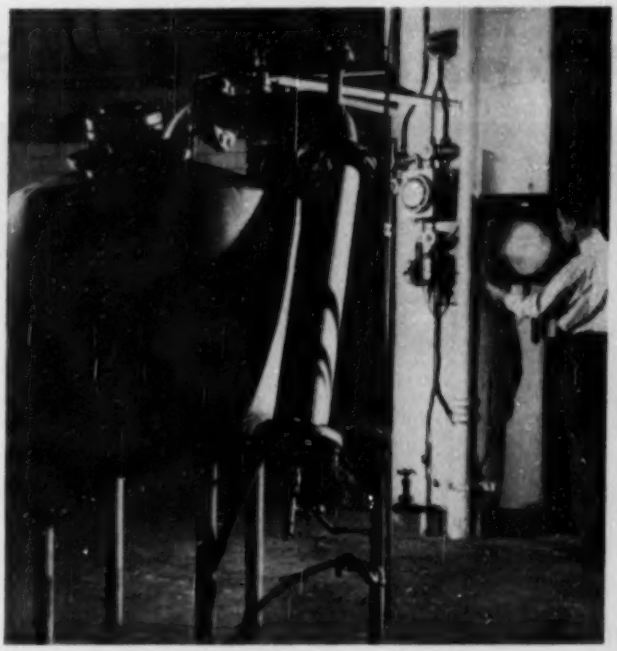
Proper laying of this second bead is not as difficult as laying of the cover bead in the 3-bead butt weld. Yet skilled welders are still required. Fit-up is not a great problem since strips are butted against the finished weld on the previous strip. Cost is lower than for any method except the single-bead butt.

Single-Bead Butt Weld—While single bead butt welds have been successfully used in lining work, this practice is not recommended. The highest degree of welding skill is required to securely attach the liner and seal the joints with one bead. Even then, dilution and crevice corrosion are more likely, and unsound welds may occur. This is the least expensive of all the plug or strip welding methods, but it is believed the added cost of other methods is justified to insure better results.

Butt Straps—Use of a butt strap is probably the surest way to get a satisfactory job. Dilution and fit-up cause no problems; sound welds can be made by welders of less than the highest skill although they still should be better than average. Crevice corrosion can occur, but not in properly-made welds. However, this is the most expensive method of lining since four welds are required for each joint. It should probably be considered only for the most exacting jobs or in cases where there is some doubt of the welders' ability. The ridged effect of the butt straps may cause some inconvenience in vessels that must be thoroughly cleaned periodically.

Lap Welds with Formed Edges—This offers almost as good assurance of a satisfactory job as does the butt strap method. Dilution, fit-up, and skill of welders can be considered in the same manner they were for that method. The necessity for forming one edge of each strip is added; if equipment is available this is easy. Cost of forming is more than overcome by using only two beads per joint instead of four. Cost is therefore less than for butt strap and not much more than for the 2-bead butt. The ridged effect may cause inconvenience in cleaning.

Shingle Method—This is a variation of lap welds with formed edges. Some of the same things can be said of it. While there is no forming cost, the method is seldom used because it is difficult to make the lapping edge properly meet the flat surface of the lapped strip. This means there is less assurance of sound, crevice-free welds.



Fireproof Still

Automatic controls flood still with CO_2 before leaky vacuum seal lets in enough air to cause explosion. Novelty is the trigger, falling vacuum.

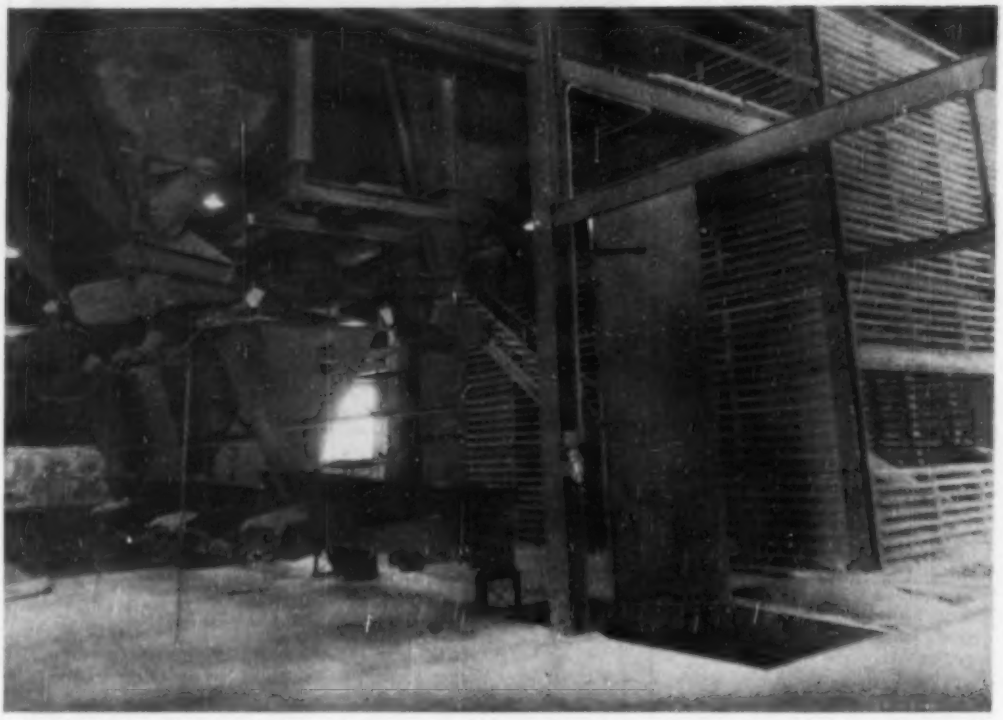
W. E. Morgan, Jr., *Manager, Industrial Div., Walter Kidde Co.*

The vacuum still shown here on the left is protected by a novel, if not unique, automatic fire extinguishing system. The still operates under a vacuum of 29½ in. Hg, and the nature of the process is such that any inleakage of air would almost certainly result in explosion and fire. Because no equipment can be absolutely foolproof, the plant operators—Smith, Kline & French Laboratories in Philadelphia — and engineers of Walter Kidde & Co. developed the system shown here. Its novelty is its actuation by changes in critical vacuum rather than by detection of heat, flame or smoke.

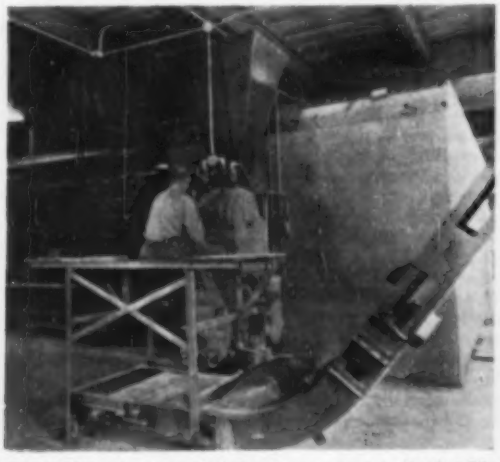
Mounted on the round column on the right, but on the floor below, is a steel cylinder containing 5 lb. of liquid carbon dioxide under about 450 psi. To prevent tampering, it is inclosed in a wire cage. The cylinder is connected directly to the top of the still by the ¼-in. line seen in the photograph. There is a special discharge head on the cylinder—an electrically tripped, weighted lever release.

On the column in front of the young man are a recording pressure and vacuum gage, an explosion-proof switch and an alarm gong. These are tied into the electrical circuit that actuates the CO_2 cylinder head release. Should the vacuum in the still drop to 25 in. Hg—a predetermined critical value as far as fire hazard is concerned—the recording vacuum control automatically actuates the circuit that opens the CO_2 release valve. Inert carbon dioxide rushes into the still via regulator valves, changes from liquid to gas and dilutes any air in the still to the point where it cannot support combustion. The supply of carbon dioxide (5 lb.) is sufficient to maintain the inert atmosphere within the still (13 cu. ft.) until the vacuum has dropped to a safe point and repairs can be made. The automatic system can be cut out manually when it becomes necessary to recharge the still, or for necessary repairs and maintenance.

Automatic Dry Mixing Slashes Labor



AUTOMATIC BATCHING EQUIPMENT. Six raw material hoppers, each with vibratory feeder to one of six weigh hoppers; conveyors to elevator which feeds mixer on floor above. All go through paces automatically after operator sets dials.



BAGGING, not automatic but easier on operator. Needn't lift full bags, just flop them back between legs onto moving belt.

STORAGE BINS for mixed fertilizer (which expands as it cures). Slats are 2x8's 4 in. apart; angle of repose is 45 deg.

Cost in Fertilizer Plant

What's more it can save raw materials, reduce labor problems, turn out a more accurate formula. Here is the first story of what is believed to be the first automatic plant of its kind in this country

R. W. PHILLIPS and J. E. MADIGAN

Mixed fertilizers now pour forth, untouched by hand, at a capacity rate of 60 tons per hour from a new $250,000 mechanical fertilizer mixing plant built for Consumers Cooperative Association at Muskogee, Okla. The principal feature of this unusual plant, one of five similar units engineered by Chemical Engineering Service of Green Bay, Wisc., is a 75 percent reduction in labor costs.

Here are the advantages of the mechanized principles used at the plant: (1) drastic labor savings, (2) fewer personnel problems during off-season periods, (3) greater accuracy of product formula, and (4) as a result of accuracy, savings in raw materials required to meet guaranteed analyses. The labor-saving equipment will more than pay for itself the first year of operation.

Every phase of plant operation—from handling of raw materials to bagging of mixed product—is designed to minimize labor. Raw materials include ammonia solution and the conventional dry ingredients. These are handled through pipeline or are conveyed mechanically. Ammonia solution is delivered by tank car and piped by 30-psig. air pressure to a 12,000-gal. storage tank. Dry ingredients are unloaded at a rail siding. They are pushed by mechanical scoop, or in the case of hopper-bottom cars, dropped into a screw conveyor, later elevated, then carried by a continuous belt to storage bins or directly to process hoppers. Each of these holds one carload. One man can unload 50 tons in 1.5 hr. at a cost of about 3 cents per ton. Cost of unloading hopper-bottom cars is even less.

R. W. PHILLIPS describes himself as "president, owner or whatever you see fit" of Chemical Engineering Service, Green Bay, Wis. He is the originator of the automatic fertilizer mixing system described in this article. J. E. MADIGAN, chemical engineer with Chemical Engineering Service, supervised construction of the Muskogee plant.

FEATURE: EQUIPMENT INNOVATIONS

The point of greatest interest is the dry ingredient mixing equipment; this is on the ground floor of a combination production and storage building. The equipment consists of a battery of six open-top, 40-ton raw material hoppers arranged in two adjacent rows of three each. All are of metal construction. They are inverted pyramids with truncated bottom outlets (see photograph) that open to separate vibratory discharge conveyors. The three hoppers in the two adjacent rows are mirror images of each other. Thus the discharge conveyors, which slope toward the mirror line, converge in pairs beneath the hoppers and above each of a row of three suspended weighing hoppers.

Weighing hoppers, although smaller, have the same general design as raw material hoppers. Each is equipped with a truncated bottom outlet to a secondary vibratory discharge conveyor. The three secondary conveyors terminate above a double-helical mixer located along the sideline of the hoppers.

Two bucket elevators serve as feed and discharge conveyors for the dry ingredient mixing equipment. The discharge elevator connects the discharge end of the double-helical mixer with an ammonia-mixer hopper suspended above the third floor level. From this hopper a final vibratory conveyor bridges to an ammonia mixer. This is a continuous paddle-and-screw mechanical mixer into which ammonia solution is piped.

Operations begin by charging the hoppers from storage bins at ground level. Raw material is pushed by mechanical scoop into the feed elevator which delivers it to a shaker screen two levels above the dry ingredient mixing equipment. Material rejected by the screen passes through a crusher and recycles to the base of the elevator. Material passing through the screen drops to the level beneath. There a reversible, 12-ft. conveyor belt delivers it through floor gratings to any one of the six open-top raw material hoppers.

For example: assume that 400 tons of 4-12-4 fertilizer mixture is desired. Each ton of this mixture requires 147 lb. of ammonia solution, 48 lb. of ammonium sulphate, 1,200 lb. of superphosphate of 20 percent P_2O_5, 133 lb. of muriate of potash, 100 lb. of fullers earth, and 372 lb. of dolomite.

To prepare for the mixing operation, the mechanical scoop is used to fill separate raw material hoppers with ammonium sulphate, muriate of potash, fullers earth and dolomite; the two remaining hoppers are filled with superphosphate. This gives enough ammonium sulphate, muriate of potash, and fullers earth for the entire 400 tons. But it is necessary for an operator to replenish the superphosphate and dolomite hoppers during the mixing operation. All raw material hoppers can be filled by one man in two hours.

MIXING: CONTROLLED BY ONE MAN

The mixing process is controlled by a single operator from a central control room located beside the dry ingredient mixing facilities. Control room equipment consists of three dial scales and various other panel controls. Each dial scale is interconnected so that it registers the weight in one of the three weighing hoppers. Thus each scale weighs materials from the two raw material hoppers feeding their integral weighing hopper.

Each scale dial has a conventional indicator on its front and two control hands on the rear. Each control hand limits the flow of ingredient from the vibratory conveyor of one of the two raw material hoppers served by the scale. Control hands for each scale are designated as *A* and *B*.

To illustrate: a scale is locked on zero and the *A* and *B* hands set for the amounts of materials to be withdrawn from the two hoppers containing materials *A* and *B*. In this case, assume *A* to be sulphate of ammonia

and *B* to be fullers earth. The *A* control hand is set at 48 lb. The *B* hand is next set at 148 lb. to get the desired 100 lb. by difference. The remaining two scales are set in a similar manner for the desired weights of their respective materials. Since two raw material hoppers contain superphosphate, the required weight of this material is divided between two scales. Scale settings can be completed in less than one minute.

A starter button is provided to begin operations. This button activates three vibratory conveyors that feed three different ingredients from raw material hoppers to the three separate weighing hoppers. Lights burning on a panelboard indicate each material being fed. Each vibratory conveyor has two speeds governed by separate rheostats. High speed is used during the greater part of the operation; slow speed for accuracy when finishing batches. A magnetic switch automatically reduces the operating speed when the weighing hopper load is within 40 lb. of its weight setting. As soon as the *A* hand setting is reached on each scale, its conveyor cuts off and the *B* conveyor goes into operation.

When weights on any one scale are completed, a "hold" light comes on and the scales do not operate until other scales have fulfilled their weight settings. When all "hold" lights are burning there is a 3-sec. lapse before the lights go out and operations continue. Green lights then come on as the weighing hopper conveyors start emptying batch weighings into the double-helical mixer.

When all weighing hoppers are empty, the operation automatically repeats itself. When the entire 400 tons is completed, a pre-set control goes into operation, rings a bell and shuts off the equipment.

AMMONIATING: MECHANIZED

During repetitions of the weighing cycle, the material discharging from the double-helical mixer is lifted by elevator to the ammonia-mixer hopper on the top floor. Before this hopper fills the operator must prepare for ammoniation. This means that the flow rate of dry ingredient from hopper to mixer, as well as the flow of ammonia solution to the mixer, must be pre-set. Both rates are set at the control room. Dry ingredient flow is limited by a batch timer.

For example: if a production rate of 30 tons per hour is desired, the timer is set to complete each batch in 2 minutes; if 40 tons per hour is desired, the timer is set for 1 minute and 30 seconds. Ammonia solution flow is controlled by a rotameter. The setting for this instrument is determined by multiplying the pounds of solution per ton of product (147) by the tons of product per hour (40). Thus, for 4-12-4 fertilizer at a 40-ton-per-hr. rate, the setting is 147 × 40 or 5,880 lb. per hour.

When the ammonia-mixer hopper accumulates two tons of mixed dry ingredients, a bin indicator automatically energizes a vibratory conveyor to discharge the hopper contents at the pre-set rate to the paddle-and-screw type ammonia mixer. The same indicator also activates a solenoid valve to admit ammonia solution to the mixer at the pre-set rate.

After settings have been made, the flow of completed fertilizer from mixer to storage is normally continuous. If abnormal conditions cause the ammonia-mixer hopper to run low, a low-level bin indicator automatically cuts off both dry ingredients and ammonia solution. As an added safety measure, a Micro-Switch is placed in the stream of material. Thus if the low-level bin indicator fails, this switch shuts off the flow of ammonia solution. Special controls allow the hopper to be emptied when formulas are being changed.

CURING: NOVEL STORAGE BINS

Completed fertilizer is sent from the continuous mixer to storage bins for curing. A special feature of the Muskogee storage bins is a novel slat-type wall construction which consists of 2x8-in. boards supported flatly, one above the other, by 4-in. spacers.

This arrangement gives a bin wall with the general appearance of an opened venetian blind. Fertilizer material does not flow through the spaces between the boards because of its 45-deg. angle of repose. The advantage of this wall design lies in the fact that expansion of the material during curing places no undue strain on the walls of the storage bin.

BAGGING: ONE OPERATOR

To prepare material for shipment, a St. Regis bagging machine has been installed on the ground floor. With this machine, one operator can automatically weigh and seal bags at a rate of 12 to 18 per minute.

Filled bags are discharged to a conveyor and elevated to the second floor. Here they are discharged to a slat-type shuttle conveyor which drops them through a chute into boxcars or trucks. A mechanical counter keeps tabs on the number of bags loaded. A duplicate counter on both batches and bagger is installed in the plant manager's office.

OTHER FEATURES: A LOT OF THEM

Many other special features are incorporated in the Muskogee plant design. Most of these are directly connected with the automatic weighing equipment. Air jets are installed in raw material hoppers to loosen any material that might possibly bridge the hopper outlets.

Special controls are also provided to balance the delivery of a large quantity of material from one hopper with the small quantity that might be required from another. Thus the weighing operation may be speeded up or slowed down so that a scale on which 1,200 lb. is being weighed can complete its operation in the same time that another is weighing 100 lb. In addition, each scale is electrically wired so that, by opening a switch, it can be removed from the operation. This allows the operation to continue uninterrupted when the formula does not require raw materials from all hoppers.

To prevent false weights that might result from material caking in the weighing hoppers, a 50-lb. tare is added to the weight of each hopper when scales are adjusted. Thus when a scale shows zero, 50 lb. of material remains in the hopper to compensate for build-up of caked material.

Additional insurance provides that the prescribed weights of all ingredients enter all batch weighings. This is done by an electrically connected bell which rings whenever a scale indicator returns to zero before preset discharge time for batch expires.

OPERATING COSTS: SLASHED

The unusually low costs for operation of the Muskogee plant should be emphasized. For example: the cost of unloading raw materials has been reduced to approximately 3 cents per ton; the mixing and ammoniating operations require only two operators; the bagging machine operators can more than keep pace with top production rates.

As a result, total labor cost for short periods are only 23 cents per ton. Over long periods (that include many interruptions) it increases to an average of only 60 cents per ton. This is radically below the $2.41 average direct labor cost per ton for 82 typical fertilizer mixing plants surveyed by the U. S. Department of Labor.

The Muskogee plant is the fifth of its type designed and built by Chemical Engineering Service since 1947; it began operations in mid-1949. The firm believes it is the first to design and build fully automatic dry mixing fertilizer plants in this country.

PROJECT ENGINEERING

Project engineering is the business of building plants — from the preliminary study through the design, procurement, erection and trial operation. It is a problem in management and a business in itself, with its own procedures and its own opportunities for blunder and oversight by the inexperienced.

DAVID GORDON
David Gordon & Co., Engineers, N. Y.

The management and engineering of projects in the process industries is a business of its own, and there is no good substitute for years of front-line experience in it. There are as many wrong turns as right in laying down governing procedures, techniques and staff directions. This *Chemical Engineering* report describes guidance procedures by working through a typical project in accordance with plans that are the result of long study and trial, and that have been used successfully in a large number of actual projects.

Principles are basic

The scope of application for these principles covers any process industry—beverages, cement, chemicals, dyestuffs, explosives, fertilizer, fats and oils, paint, paper, petroleum, pharmaceutical, plastics, rubber, soap, sugar—the whole gamut. A guide, such as that set up here, for the management of a project in one process industry is applicable, with modification only in details, in any other.

The project itself may be any of three things: (1) the design and erection of a new plant, (2) the design and erection of an addition to an existing plant, (3) the revamping and modernizing of an existing plant.

Birth of the project

A project may be considered to be born the moment company executives decide real thought should be given to one of the foregoing possibilities and someone is directed to "look into it" seriously. A preliminary study is made and then, if it seems warranted, a more detailed analysis (still under the category of preliminary study, however) is completed to give the company executives enough facts upon which to base a reliable decision as to whether or not they should authorize execution of the project.

Enter project engineer

The work of the project engineer, sometimes called project manager or job engineer, properly begins with the preliminary study. Company executives cannot afford to overlook any worthwhile factor in arriving at their fundamental decision to proceed or not to proceed with the execution of the project. The project engineer will contribute early factual information and will offer opinions reflecting his past experience and his familiarity with current allied events; these may vitally affect the nature of that decision. If it is to proceed, the project manager will have gained time, and his acquaintance with the background of the project will, in its later execution, promote a smoothness that can hardly be recaptured by the man called in after all major decisions have been made and actual engineering is ready to be assigned. If the decision is not to proceed with the execution of the project, it will be found that the project manager, whose integrity was part of the basis for his selection, will have more than earned his keep through his contributions during the period leading to that decision.

Preliminary study

The preliminary study, described later in this report, aims at helping the company executives answer the bald question, "Are we going to make money out of this project, and how much?" The question is simple and direct. The study's conclusions submitted to the executives are too often complicated and qualified to the point where their usefulness is seriously reduced. As a rule, the more experienced and

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DAVID GORDON, *prior to forming his own engineering company, was project manager for Max B. Miller Co. and for M. W. Kellogg Co. In addition to this special report for* Chemical Engineering, *he is doing a series of articles for* Petroleum Refiner, *to begin within a few months, dealing in detail with the project management and engineering of a typical petroleum refinery.*

better informed the participants in the study, the simpler and more positive the study's conclusions.

The execution of the project, also described later in detail, aims at bringing the projected plant or unit into actual operation—within a period of time previously agreed upon; within expenditures for engineering, equipment and construction previously agreed upon; and with realization of anticipated operating costs, capacities, product quality, etc.

Consulting and Engineering Companies

Value of "outside" project engineers

Medium and small size process industry firms almost always, and the largest firms sometimes, find it necessary and profitable to engage the services of outside engineers to help with their projects. Project management is the very business of the consulting and engineering company just as the manufacture and sale of certain products is the very business of the process industry firm. The consulting and engineering company is constantly engaged in project management on a variety of jobs and is constantly studying and striving to improve its methods; it is but natural that they bring to the project experience, ability and facilities not possessed by the process industry firm. To the latter, the project is an activity incidental to their main goals. Project management is not part of their main business, and they cannot afford to divert their time and attention from their chief responsibilities, where they are efficient, to the specialized job of project management where they are likely to be inefficient.

Of no little importance, especially in the early or preliminary-study stages of the project, is the objective and impartial viewpoint of the outside engineer, together with his ability to save the company from an incomplete picture of the forest because of immersion among the trees.

How work is divided

The division of work between the process industry firm and the engineering company varies with the type of project and the type and size of process industry firm. At one extreme, only one man may be called in to act in a consulting and advisory capacity, with all the detailed work performed by the processing company's own permanent employees; at the other extreme, the entire project with all its work and responsibilities may be placed in the care of the engineering company; and there are of course a number of combinations in between.

The accompanying diagrams illustrate the three alternatives. The very small company is almost compelled to confine itself to Method A. The very large company is in a better position to choose Method B than is the medium sized company. Method C and it's variations have perhaps been used most frequently; however, all three methods have been used at one time or another by the medium sized and very large companies.

To prevent the diagrams from becoming difficult to read many horizontal and diagonal crossing lines indicating parallel efforts have been omitted. It need simply be kept in mind that in actual execution of the project, cooperation and coordination among all departments is helpful, and among some of them absolutely indispensable.

Some concerns may delegate responsibility in accordance with a different sequence of titles from those shown in the diagrams. For example, the diagrams show a Chief Engineer serving under the Project Manager, whereas some consulting and engineering companies may have a Vice-President and Chief Engineer senior to the Project Manager. Titles should not of course be allowed to obscure actual performances; variations in titles such as those mentioned do not alter the general arrangement of functions and assigned duties as shown in the diagrams.

In determining whether or not to engage a consulting and engineering company to help with its project, and to what extent, one of the most important factors for the process industry firm to consider is this—that in the majority of cases in our past experience the process firm has, by engagement of the consulting and engineering company, saved more money than the services cost. And if the process firm is to use an outside engineer to help, then the greatest advantage will be gained by it when it calls him in at the very beginning, to help with the preliminary study.

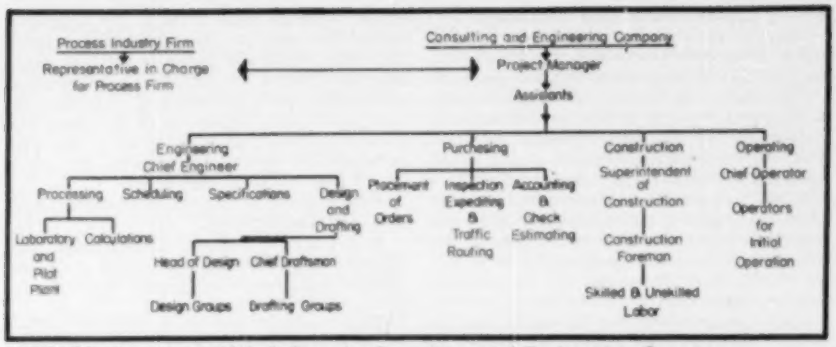
The Preliminary Study

As far as the project manager is concerned the preliminary study revolves mainly around three questions:

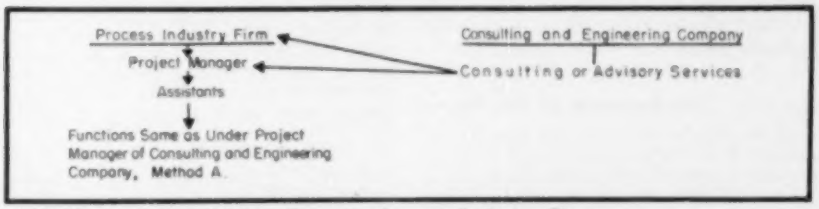
What is physically required

1.) The determination of 'what is physically required?' involves an estimate of the types and sizes of equipment and materials, building, ground area, utility facilities, etc. If the process is one that is well established and already in satisfactory operation somewhere, then the work in this phase comprises chiefly sizing up or down of equipment, piping, utilities, etc., with such pertinent innovations and improvements as have emerged since erection of the last plant of its kind. If the process is completely or partially new, careful thought must be given to types of

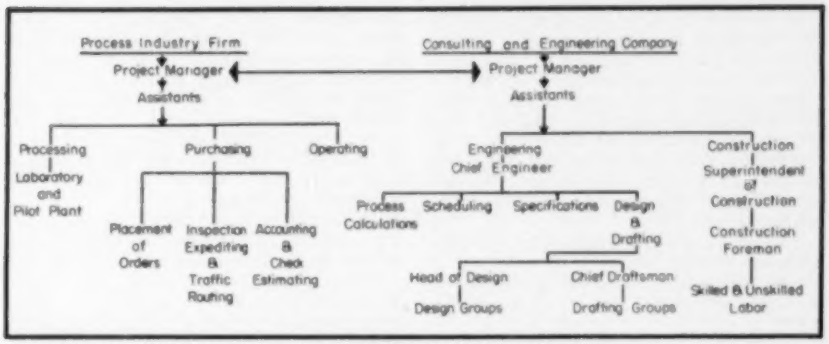
IT IS A CURIOUS FACT that the project engineer, the man who superintends the building of our plants, has escaped attention in the technical press. Reams are written of the plants he builds, scarcely a line on how he does it—how he harnesses dozens, sometimes hundreds, of engineers, draftsmen, designers, fabricators and construction men to the task of producing a plant. Our neglect of the project engineer has been more than an injustice to a unique managerial skill: to the process companies who needed him more than they knew, our silence may have been expensive. See note, p. 136.



METHOD A—Most of Work Done by Consulting and Engineering Company


Process Industry Firm
Project Manager
Assistants
Functions Same as Under Project Manager of Consulting and Engineering Company, Method A.
Consulting and Engineering Company
Consulting or Advisory Services

METHOD B—Most of Work Done by Process Industry Firm



METHOD C—Work Divided; Many Other Variations Possible

equipment and materials as well as sizes; and to materials of construction which will be different for the commercial size operation from those in the laboratory or, in a number of instances, from those in the pilot plant. There may also be required an analysis of competitive utility uses—for example, electric motors vs. steam turbines or gas engines, oil fuel vs. gas.

What it will cost erected

2.) The determination of 'what is it going to cost, erected?' involves a cost estimate of the physical requirements, above, together with an estimate of the cost of construction, ready to operate. The adequacy of this phase of the work will rest directly upon that of phase (1), and upon ready accessibility to reliable, up-to-date prices for equipment, materials and labor that can be assembled within the time allowed for the preliminary study.

What it will cost to operate

3.) The determination of 'what will it cost to operate?' involves a cost estimate of utilities consumption (steam, electricity, water, fuel), labor and supervision personnel requirements, maintenance and repairs, raw materials, and finance charges (interest, taxes, insurance). The adequacy of this work will rest directly upon that of the preceeding phases; and here too, there must be ready accessibility to reliable, up-to-date prices.

Determination of quantity of construction labor and duration of construction period under phase (2), and of labor and supervision personnel requirements under phase (3), are mat-

ters of experience for established processes, and of "experienced imagination" for new processes.

The time to be devoted to the preliminary study can be fixed, to be sure, by dictation; but it does not allow the same confident boundaries that surround the execution of the project. (The latter, as described further on, is guided by a carefully prepared time schedule which comes close to a guarantee of the time required). The process industry firm's executives know they are going to base their fundamental decision—on whether or not to proceed with the project—on the results of the preliminary study; and the project manager knows that he will be asked to assure these executives that his figures are reliable within such and such a percentage plus or minus; but the time to be spent on the preliminary study is customarily not subject to a calculated time schedule. It remains somewhat fluid, and somewhat a matter of compromise.

The Execution of the Project

In the process for which the plant of this report is to be designed and erected, there are the unit operations of fluid flow (pumping of gases and liquids, compression of gases), heat transfer (heating, cooling and condensation), combustion, distillation and fractionation, mechanical separation, evaporation, and diffusion.

In addition to these chemical engineering unit operations there are involved in the design of the plant the functions of mechanical, civil, and electrical engineering for such work as piping, furnaces, foundations, structural steel, electric power and lighting systems, etc. The activities of the purchasing department, of the construction force, and of the operating group are also part of the complete project. Overall—supervising, directing, and coordinating—is the project engineer.

The various phases comprising the complete execution of the project—from collection of process information to initial operation—are described individually in the balance of this report.

Process Information

(a) The process information comprises the following:

Written description of the process.

(b) Notes regarding special safety precautions, possible operating peculiarities, and reactions with materials of construction.

(c) Knowledge of all raw material, product and intermediate process quantities in convenient and appropriate units. Volumes should refer to both standard and operating conditions. Where a unit may have several values, those used should be clearly specified; thus a 'day' should be defined as calendar or operating, as 24, 16 or 8 hr.; a 'barrel' should be defined as 50 or 42 gal.; a 'ton' as 2,200 or 2,000 lb. Failure to follow these elementary precautions leads to loss of time when in subsequent references to the process information, either during the engineering design work or later, the quantities looked for must be calculated anew because they were not clearly shown in the first place; and the chances for introducing troublesome arithmetical errors are increased after the factors used in the calculations of the quantities (densities of the liquids and gases at the temperatures and pressures in question, etc., etc.) are no longer fresh in one's mind.

(d) Knowledge of all process temperatures, pressures and concentrations.

(e) Knowledge of physical characteristics and chemical compositions and properties of all raw, product and intermediate process materials, under operating conditions.

(f) Heat, material, and energy balances around all significant operations or pieces of equipment. The balances around process equipment as such (a still, a fractionating tower, etc.) should be complete at this stage; but some of the balances, such as energy balances around utility users, can be only general and approximate at this time, pending engineering design, procurement of equipment, and information on manufacturers' specified operating efficiencies, etc.

(g) A complete process flowsheet. This is diagrammatic. It shows the flow of the process streams, and tabulates at the appropriate points on the process stream lines and equipment outlines as much of the foregoing listed process information as can be conveniently placed on the drawing. Many simplified and stripped down process flow diagrams for various products have been, and continue to be, published in *Chemical Engineering*. A flowsheet such as would be used in actual execution of a real project would resemble one of these flow diagrams; it would differ primarily in that it would be expanded in detail and would contain as tabulated information much of that described in paragraphs (c) through (f).

The book The furnishing of the process information is, more often than not, a joint effort by the process industry firm and the consulting and engineering company. Some it, particularly with respect to laboratory and pilot plant work, may have been completed during the preliminary study period.

All of the process information completely assembled in the form of a report or 'book,' becomes the basis for succeeding steps in the engineering of the project.

Site Information

(a) The plot Location with reference to adjacent areas, and restrictions imposed thereby; codes (building, safety, and other—state and local); labor regulations and conditions; accessibility to freight and passenger transportation; elevation above sea level; type of soil (rock, gravel, sand, silt, clay); allowable soil loading (need for test borings, mats, piling); grade, and relation between grade and foundation tops and depths; ground water level; drainage conditions; need for waterproofing of underground conduits.

Location and direction of all lines (underground, grade and overhead—piping and elec-

trical); sewers, conduits, tracks, roads, etc., crossing the battery limits.

Atmospheric temperatures; wind velocities; rainfall; special conditions such as earthquakes, cyclones, exceptionally severe or prolonged cold, heat or humidity.

(b) Available utilities

(1) Steam:—Process; Heat; Power.

Total pounds per hour of high (or live) and low (or exhaust) steam available; reliability of supply; maximum and minimum pressures of live and exhaust at battery limits; quality; condensate recovery considerations.

(2) Electricity:—Power; Lighting; Instruments.

Type of current (usually a.c., but on occasion d.c. for some buildings); characteristics (voltage, phase, cycle) for each system (usually power on one system, lighting and instruments on the other); kilowatts available for each system; reliability of supply; restrictions of voltage (horsepower, maximum demand, interrupting capacity); special requirements (explosion proof, vapor proof, splash proof, tropical insulation, etc.).

(3) Water:—Process; Cooling; Boiler Feed, if any steam to be generated within plant; Drinking and Sanitary.

Sources of supply; gallons per minute of each available; reliability of supply; maximum and minimum pressure at battery limits (at grade of each; quality (analyses if necessary); range of temperatures (at battery limits); maximum permissible temperatures in use; recirculating considerations (spray ponds, cooling towers, etc.).

(4) Fuel:—Gas; Oil; Coal; Waste Residues.

For all fuels—quantities available; sources of supply; reliability of supply.

For gas—pressure and temperature ranges at battery limits; analysis, especially moisture content; cleanliness; gravity; heating values, to be identified as high or low.

For oil—same as for gas; plus ash and sediment contents, and viscosities.

For coal and waste residues—analyses; heating values; cleanliness; special characteristics affecting use of particular fuel.

(5) Air:—Process; Compressed Air for Instruments, Controls, Cleaning, Power.

Quantities available at specified pressures and temperatures; sources and reliability of supply; cleanliness and moisture content; possible separation of systems for the diffrent uses.

(c) Disposal systems

Sewers; blow-downs; open trenches and sludge basins; separators; chemical treaters. Requirements for sanitary and storm sewers; special provisions for disposal of objectionable wastes from process (gases, liquids, solid mixtures) including consideration of byproduct recovery.

Preparation of Schedule

The contract for the execution of a project, such as the design and erection of the new plant envisaged in this report, is undertaken with the understanding that the plant will be completely erected within a definite, agreed upon time after the signing of the contract.

Such an obligation can be met only by the most careful planning in advance, and by the smooth meshing of the tasks of all the groups engaged in the work.

To permit the achievement of these aims, a guide is set up which usually bears the title of 'The Schedule.' The degree of success in meeting the agreed upon time period will depend upon the skill and understanding with which the schedule is prepared, and upon the earnestness with which it is observed during the progress of the job.

This report discusses in this section the preparation of the schedule; its use will become clear through the references and explanations in subsequent portions of the report.

A typical schedule is shown on the following spread.

Based on the past experience of the consulting and engineering company, the requirements of the process industry firm, and the general circumstances, a period of 10½ months has been agreed upon in this instance as the permissible duration between the signing of the contract and the completion of construction.

The schedule shows this period extending from the middle of October 1949 to the end of August 1950.

Preliminary schedule

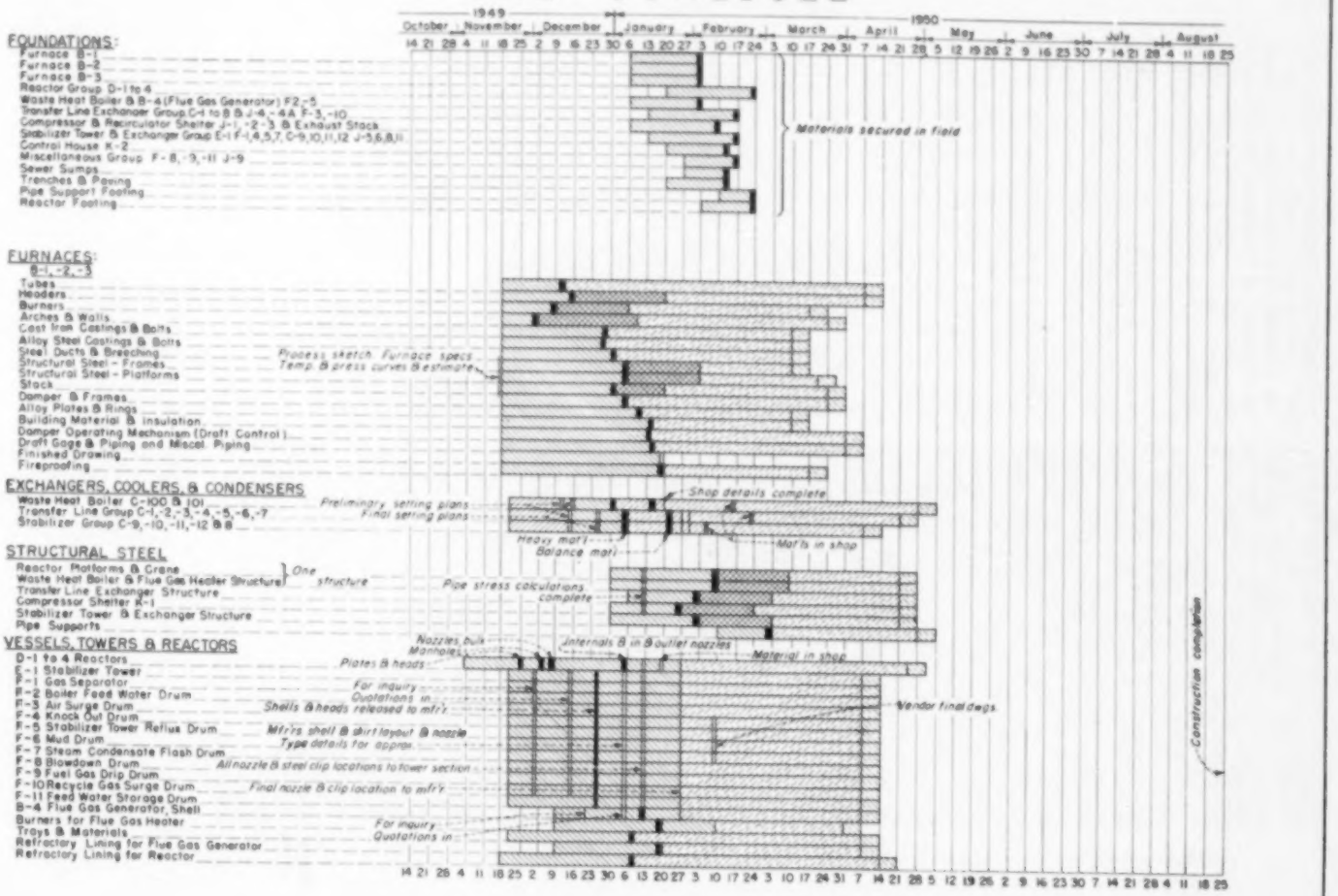
One of the factors affecting the agreements on a 10½ month period will have been the prior preparation and study of a preliminary schedule. If, during the later preparation of the working schedule (which is the one described in this report) it becomes evident that the agreed upon period is too tight or too loose, the necessary adjustments are made with the consent of the process industry firm. For the sake of simplicity, it is assumed that the working (or final) schedule shown here and the prior preliminary schedule were in agreement as far as over-all periods were concerned.

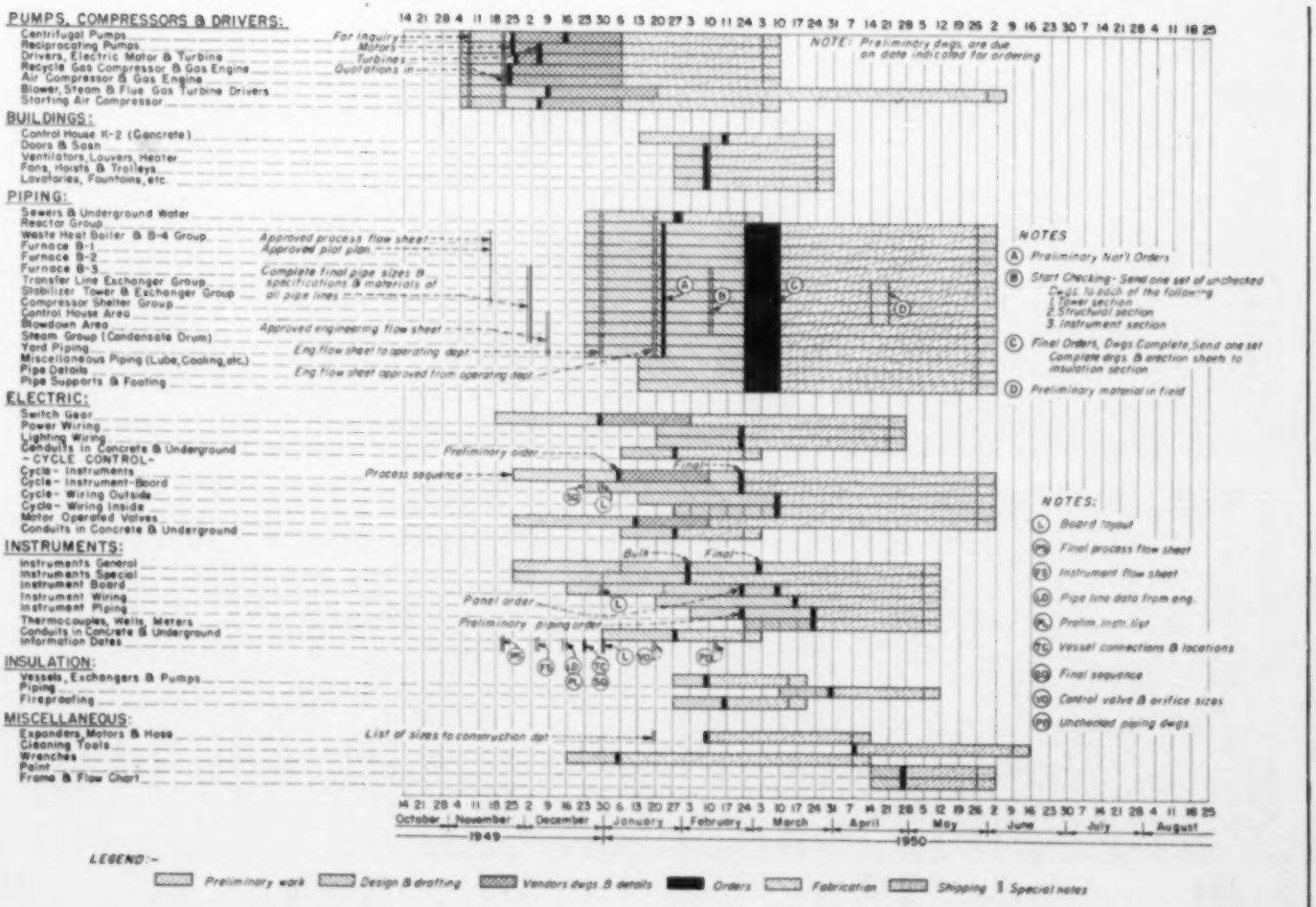
The schedule defines the time periods to be spent on their tasks by the engineering and purchasing groups, by the chosen manufacturers and suppliers of equipment and materials and by the construction force; i.e., for the performance of all the various phases in the execution of the project.

The period of initial operation of the completed plant, i.e., the period elapsing from the completion of construction to the transfer of the project to the owner as a satisfactorily operating plant is not shown in this schedule; this period is subject to variation depending on the

THE SCHEDULE (NEXT PAGE) is the measure of the project engineer's skill. It is the crystallization of all his experience, his ingenuity and his ability to organize a team. Done properly the schedule is the "battle plan" of the project; more than anything else it determines whether or not everything gets done and done on time. To draw up the schedule on the next two pages (which incidentally represents a real project now in progress) the project manager had to know what the thousand and one details were that had to be handled, what type personnel was needed for each job, how long it should take them to do it, which jobs had to be started first to let other jobs get under way.

THE SCHEDULE


1949
October
November
December
1950
January
February
March
April
May
June
July
August
14 21 28 4 11 18 25 2 9 16 23 30 6 13 20 27 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 7 14 21 28 4 11 18 25
FOUNDATIONS:
Furnace B-1
Furnace B-2
Furnace B-3
Reactor Group D-1 to 4
Waste Heat Boiler & B-4 (Flue Gas Generator) F2,-5
Transfer Line Exchanger Group C-1 to 8 & J-4,-4A F-3,-10
Compressor & Recirculator Shelter J-1, -2, -3 & Exhaust Stack
Stabilizer Tower & Exchanger Group E-1 F-1,4,5,7, C-9,10,11,12 J-5,6,8,11
Control House K-2
Miscellaneous Group F-8, -9, -11 J-9
Sewer Sumps
Trenches & Paving
Pipe Support Footing
Reactor Footing
Materials secured in field
FURNACES:
B-1, -2, -3
Tubes
Headers
Burners
Arches & Walls
Cast Iron Castings & Bolts
Alloy Steel Castings & Bolts
Steel Ducts & Breeching
Structural Steel - Frames
Structural Steel - Platforms
Stack
Damper & Frames
Alloy Plates & Rings
Building Material & Insulation
Damper Operating Mechanism (Draft Control)
Draft Gage & Piping and Miscel. Piping
Finished Drawing
Fireproofing
Process sketch. Furnace specs.
Temp. & press. curves & estimate
EXCHANGERS, COOLERS, & CONDENSERS
Waste Heat Boiler C-100 & 101
Transfer Line Group C-1, -2, -3, -4, -5, -6, -7
Stabilizer Group C-9, -10, -11, -12 & 8
Preliminary setting plans
Final setting plans
Shop details complete
Heavy mat'l
Balance mat'l
Mat'ls in shop
STRUCTURAL STEEL
Reactor Platforms & Crane
Waste Heat Boiler & Flue Gas Heater Structure
One structure
Transfer Line Exchanger Structure
Compressor Shelter K-1
Stabilizer Tower & Exchanger Structure
Pipe Supports
Pipe stress calculations complete
VESSELS, TOWERS & REACTORS
D-1 to 4 Reactors
E-1 Stabilizer Tower
F-1 Gas Separator
F-2 Boiler Feed Water Drum
F-3 Air Surge Drum
F-4 Knock Out Drum
F-5 Stabilizer Tower Reflux Drum
F-6 Mud Drum
F-7 Steam Condensate Flash Drum
F-8 Blowdown Drum
F-9 Fuel Gas Drip Drum
F-10 Recycle Gas Surge Drum
F-11 Feed Water Storage Drum
B-4 Flue Gas Generator, Shell
Burners for Flue Gas Heater
Trays & Materials
Refractory Lining for Flue Gas Generator
Refractory Lining for Reactor
Nozzles, bulk
Manholes
Plates & heads
For inquiry
Quotations in
Shells & heads released to mfr'r
Mfr'rs shell & skirt layout & nozzle
Type details for approv.
All nozzle & steel clip locations to tower section
Final nozzle & clip location to mfr'r
For inquiry
Quotations in
Internals & in & outlet nozzles
Material in shop
Vendor final dwgs.
Construction completion


PUMPS, COMPRESSORS & DRIVERS:
Centrifugal Pumps
Reciprocating Pumps
Drivers, Electric Motor & Turbine
Recycle Gas Compressor & Gas Engine
Air Compressor & Gas Engine
Blower, Steam & Flue Gas Turbine Drivers
Starting Air Compressor
For Inquiry
Motors
Turbines
Quotations in
BUILDINGS:
Control House K-2 (Concrete)
Doors & Sash
Ventilators, Louvers, Heater
Fans, Hoists & Trolleys
Lavatories, Fountains, etc.
PIPING:
Sewers & Underground Water
Reactor Group
Waste Heat Boiler & B-4 Group
Furnace B-1
Furnace B-2
Furnace B-3
Transfer Line Exchanger Group
Stabilizer Tower & Exchanger Group
Compressor Shelter Group
Control House Area
Blowdown Area
Steam Group (Condensate Drum)
Yard Piping
Miscellaneous Piping (Lube, Cooling, etc.)
Pipe Details
Pipe Supports & Footing
Approved process flow sheet
Approved plot plan
Complete final pipe sizes & specifications & materials of all pipe lines
Approved engineering flow sheet
Eng. flow sheet to operating dept.
Eng. flow sheet approved from operating dept.
ELECTRIC:
Switch Gear
Power Wiring
Lighting Wiring
Conduits in Concrete & Underground
-CYCLE CONTROL-
Cycle- Instruments
Cycle- Instrument-Board
Cycle- Wiring Outside
Cycle- Wiring Inside
Motor Operated Valves
Conduits in Concrete & Underground
Preliminary order
Final
Process sequence
INSTRUMENTS:
Instruments General
Instruments Special
Instrument Board
Instrument Wiring
Instrument Piping
Thermocouples, Wells, Meters
Conduits in Concrete & Underground
Information Dates
Bulk
Final
Panel order
Preliminary piping order
INSULATION:
Vessels, Exchangers & Pumps
Piping
Fireproofing
MISCELLANEOUS:
Expanders, Motors & Hose
Cleaning Tools
Wrenches
Paint
Frame & Flow Chart
List of sizes to construction dept.
14 21 28 4 11 18 25 2 9 16 23 30 6 13 20 27 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 7 14 21 28 4 11 18 25
October | November | December | January | February | March | April | May | June | July | August
1949
1950
NOTE: Preliminary dwgs. are due on date indicated for ordering
NOTES
(A) Preliminary Nat'l Orders
(B) Start Checking - Send one set of unchecked Dwgs. to each of the following
1. Tower section
2. Structural section
3. Instrument section
(C) Final Orders, Dwgs Complete, Send one set Complete drgs. & erection sheets to insulation section
(D) Preliminary material in field
NOTES:
(L) Board layout
(PS) Final process flow sheet
(FS) Instrument flow sheet
(LD) Pipe line data from eng.
(PL) Prelim. instr. list
(TC) Vessel connections & locations
(SQ) Final sequence
(VC) Control valve & orifice sizes
(PD) Unchecked piping dwgs.
LEGEND:-
Preliminary work
Design & drafting
Vendors dwgs. & details
Orders
Fabrication
Shipping
Special notes

type and novelty of the plant, and special agreements with the owner.

Requires knowledge and tact

The preparation of the schedule requires not only familiarity with actual operations of each of the afore mentioned phases, but also a degree of diplomacy. Each individual group will, within reasonable limits, want as much time as possible for its own task. This may be more than the over-all restrictions of the schedule will permit; yet, the period shown on the schedule for each group must represent a promise by that group, a promise that it knows from past experience it can normally fulfill and that it faithfully intends to keep. If this is not so, the schedule will achieve just the opposite of its purpose—it will mislead instead of lead.

The preparation of the schedule involves, then, a series of conferences with the various participants.

What to do first

First comes the determination of the time for the preparation and the approval of the process flowsheet and the plot plan. By 'approval' is meant approval by the project manager for the consulting and engineering company and by the representative (or project manager) for the process industry firm. (It is assumed that the extent and kinds of approval have been fully discussed and clearly defined in the negotiations preceding the contract). The process flowsheet as approved at this stage should be complete and accurate enough to serve as the final process flowsheet. The plot plan as approved at this stage shows primarily the battery limits, lines crossing the limits, and the desired general arrangement of equipment within the limits. The final plot plan cannot be assembled until the final sizes of equipment, as purchased, are known.

Reference to the schedule will show the date, November 18, for the above two approvals in the piping section. It is shown in this section partly because of the direct use of the process flowsheet in the determination of pipe sizes (i.e., the use of the process flowsheet for the information on quantities flowing through the pipelines, and on their physical states, etc.; actual calculation of pipe sizes requires also reference to the engineering flowsheet, the plot plan, individual diagrams, etc., as explained later). This Nov. 18 date for the approval of the process flowsheet does not restrict all work to a beginning date of Nov. 18 or later. It must be remembered that the process flowsheet represents, in one sense, the culmination of all the process information in a summarized manner; and some of this process information can be put to use before it is assembled in the form of the final approved process flow sheet. Thus, the information needed for the submission of inquiries to manufacturers of pumps, compressors, and drivers is shown in the schedule as being available on Nov. 7. It is just such items as these that repeatedly demonstrate the indispensability of a good practical working schedule.

Next step

The next step is the fixing of the dates for complete final pipe sizes & specifications & materials of all pipelines and for the approved engineering flowsheet. These dates, shown in the piping section, are Dec. 2 and Dec. 9, respectively.

Having fixed these dates, one may now turn to those departments whose work may begin early because of the usefulness to them of that process information that has already been made available.

It must be kept in mind, as the succeeding steps in this schedule are discussed, that we are dealing here with the *preparation* of the schedule, and that this preparation will have been completed, and copies printed and distributed to all parties concerned before the actual operations of any of the departments begin. It must also be kept in mind that while discussion may center on one department at a time, the actual preparation of the schedule requires constant shuttling back and forth among the various departments whose general operations are to proceed in parallel and be interdependent, so that if one department fails to meet its schedule commitments it will automatically throw out of gear one or more other departments. As mentioned earlier, the essence of the schedule in operation will depend on the smooth meshing of the different departments. It is not infrequently necessary therefore for the compiler of the schedule, after he has fixed the periods for one department and conferred with a second, to return to the first for adjustments, until both, or more, departments are in agreement.

Then pumps etc.

One of the departments, whose work may begin early because of the usefulness to them of the process information already available, is that of pumps, compressors and drivers. Discussion among this department, the project manager and the purchasing department lead to a date, Nov. 7, for the sending out of inquiries to vendors of this equipment (eleven days prior to the approval of the process flowsheet). Through conferences with the selected bidders and demands placed upon them, all bids or quotations are to be in on Nov. 22, two weeks after the submission of the inquiries. Conferences with the engineering department, the purchasing department, and the process industry firm's representative lead to the expectation that the quotations can be analyzed, successful bidders chosen, and orders for their equipment placed within a few days to a few weeks after receipt of quotations—on the dates shown in the schedule by solid blocks. Of primary importance to the other inter-relating departments are the dates on which the pump, compressor, or driver manufacturer's drawings and details will be at hand; showing foundation plans for the foundation group, location and sizes of piping connections for the piping group, etc. Discussions with the manufacturers, and past experience, leads to the selection in the schedule of Jan. 6 for receipt of most of them, and Jan. 20 for the remainder.

In a similar manner, estimates are made of the time required by the manufacturers for the fabrication and shipment of their equipment. The schedule shows the end dates to be, for most of the equipment, March 3 and 10, respectively; and for some special equipment, May 29 and June 5, respectively.

Other departments or groups which may have

begun their work on or about Nov. 18 are those for the furnaces; exchangers, coolers and condensers; vessels, towers, and reactors; some of the electrical and some also of the instrument work.

Other departments

Turning to the furnaces, it will be seen that process information together with specifications are delivered to the furnace department on Nov. 18 and that there follows a period of design and drafting work to end on the dates estimated by that department. The time needed for submission of inquiries, analysis of quotations, etc., for the purchase of material is included in the design and drafting period, in this case. Orders are then to be placed, as shown by the solid blocks in the schedule; in some instances there are manufacturers' or vendors' drawings and details to be supplied; and there follow the periods of fabrication and finally shipment to the field.

Work in the foundation design and drafting group is scheduled to start later, i.e., after equipment weights and sizes and foundation plans are available from the equipment manufacturers. The starting date in this schedule is shown as Jan. 6.

The compiling of the schedule with the other departments follows the same general procedure as already described. Special attention may be called to the piping department schedule which ties so intimately and vitally into the work of the other departments. It will be noted that a period is scheduled, during piping design and drafting work, for study of the engineering flowsheet by the operating department, and that approval is secured from the operating department before any piping orders are placed. The purpose of this should be apparent: it often discloses oversights, inaccessible valves or controls, etc. Because of the large amount of detail involved, and the need to save time, preliminary material orders are first placed by the purchasing department for round lots of various sizes and series of piping, valves and fittings (shown in the schedule as A, Jan. 23, 1950). Later, after all drawings have been checked, the placement of final orders are scheduled (shown in the schedule as C, Feb. 24 to March 10, 1950).

Battle plan

The completely prepared schedule, having been agreed to by the various departments involved and having been accepted by the project manager in charge for the consulting and engineering company, and by the representative or project manager in charge for the process industry firm, is distributed to all the department heads participating in the project. It remains steadily before the eyes of the leaders throughout the job—like the map of a territory over which a battle campaign has been planned and is being waged. The conformance of the actual work to the previously assigned places in the schedule is constantly watched and reported so that any divergence, or approaching divergence, may be immediately recognized and adjusted.

Job Specifications

The job specifications, together with the various flowsheets, the plot plan and the building layout, form the guiding 'bible of information' for the different groups participating in the execution of the project.

The composition of the job specifications will be as follows: All the information called for above under Process Information and Site Information—together with design and material specifications for each of the groups (a through k below) in the design and drafting departments. Each group will carry a list of reference specifications and drawings, such as codes, standards, etc.

(a) Foundations

These will cover general notes; specifications of materials to be used; design notes on wind loads, reinforced concrete specifications, elevations, soil conditions, formwork; special notes, where necessary, on foundations for furnaces, stacks, vessels, towers and reactors, pumps, compressors and drivers, buildings, trenches, grading and paving, sewers.

(b) Furnaces

These will cover general notes; design notes and material specifications for settings, steel work, tube supports, tubing, headers, burners, flue gas ducts, and stacks.

(c) Exchangers, coolers, condensers

These will cover general notes; design notes and material specifications for pipe, tubing, shells, heads and baffles; corrosion allowances; joints and gaskets; limitations on surfaces in given sizes, passes, etc.; methods of testing.

(d) Structural steel

These will cover general notes; material and fabrication specifications for structural steel; general structural steel design specifications; and special notes on stresses and wind loads, platforms and flooring, stairs, ladders and pipe supports, etc.

(e) Vessels, towers, reactors

These will cover general notes; material specifications for steel and alloy plate, nozzles, flanges, bolts, etc.; design notes on design pressures, permissible stresses, types of joints, corrosion allowances, vessel supports, trays and internal piping, and access facilities.

(f) Pumps, compressors, drivers

These will cover general notes; material specifications; design notes on bearings and lubrication, shaft sleeves, impellers, casings, critical speeds; pistons, cylinders, valves; stuffing boxes and packing, couplings, bases, pipe connections, auxiliary piping; insulation and tests; drivers (motors, turbines).

(g) Buildings

These will cover general notes; material and design specifications for walls, roof, roof covering, parapets, down-spouts, doors, hardware, windows, ventilation, floors; special features.

(h) Piping

These will cover general notes; design and construction notes; material specifications defining precisely and in detail the types, materials, series, and sizes of piping, valves and fittings corresponding to the different divisions of service based on temperatures, pressures, and corrosion conditions.

(i) Electrical

The specifications for motors are covered under (f) Pumps, Compressors, and Drivers.

These electrical specifications cover general notes; design and material specifications for switchgear equipment, feeders, mounting, push button stations, lighting outlets and fixtures, lamps, switches, plug receptacles, lighting panel, conduit and fittings, wire and cable, grounding, instrument and pyrometer wiring.

(j) Instruments

These cover general notes; design and material specifications on mounting, charts, instrument boards, wells and thermocouples, piping

and wiring; and notes on the selection of instruments (indicators, recorders, and controllers) for temperatures, pressures, flow, liquid levels; control valves; gage glasses, etc.

(k) Insulation, fireproofing, painting

These cover general notes; design and material specifications for the insulation, fireproofing and painting of the equipment listed in the groups above.

Plans and Flowsheets

Chronologically, the preparation of the drawings described below takes place early in the job. This is necessarily so, since they, like the job specifications, govern and direct all the subsequent detail work. Reference to the schedule shows for example that the plot plan is assigned for approval on Nov. 18, before most of the design and drafting departments have gotten under way at all; and the engineering flowsheet is assigned for approval on Dec. 9.

It is inevitable that as the job progresses there will be additions and changes, minor in nature if the job has been thoroughly thought out and is well organized. The additions and changes require their own approvals.

(a) Engineering flowsheet

The engineering flowsheet is built up from the process flowsheet. It shows all process pipelines, valves, etc., with each line identified by appropriate symbols in such a manner that reference to corresponding tabulations will show the service of the line, its size, and the material, type and thickness of pipe, as well as the related information for the valves and fittings in the line. In addition to the process lines, there will be shown the various drains, by-passes, vents, relief lines, etc. The calculation of the sizes of all of these lines is a specialized task in itself, and is aided in practice by the use of previously prepared tables, curves, etc. The engineering flowsheet shows also all the essential items of equipment and their sizes. The exact number of units in a set of equipment, i.e., the number of shells in an item of heat exchangers, or the spares in an item of pumps, etc., together with all their by-pass and other connections, must be shown in the engineering flowsheet.

(b) Auxiliaries flowsheet

The auxiliaries flowsheet is similar in principle to the engineering flowsheet. It covers the so-called auxiliaries, or utilities—steam, water, fuel and air. On some jobs the auxiliaries flowsheet and the engineering flowsheet may be combined in the same drawing; on other jobs each sheet may require more than one drawing for itself.

(c) Instrumentation flowsheet

The instrumentation flowsheet is again similar in principle to the others, but it brings into relief all the instruments and controls. Reference to the schedule will show the instrument flowsheet, designated *FS* in the instruments section, to be ready on Dec. 5, a week and a half after commencement of work in the instrument department.

(d) Plot plan, building layout

The plot plan and building layout must, as mentioned earlier, be available at the beginning of the detailed work, to the extent of showing accurately the general arrangement of the major items of equipment. Principles of process flow, accessibility, safety, appearance, etc., all affect the arrangement of the equipment. The final plot plan and building lay-out must wait on the final dimensions of the equipment, but the changes necessitated thereby should be no more than minor notation changes in the drawings themselves.

Work of Design and Drafting Departments

The groups

The groups a through k listed above comprise those customarily employed in the design and drafting work needed for the complete design of a process industry plant. For the sake of clarity, each has been shown as an individual group, but sub-division to this extent is not always essential or even desirable. Thus, under some circumstances the groups on foundations, structural steel and buildings may be combined into one. Similarly, though perhaps not so readily, the electrical group might be combined with the one for pumps, compressors, and drivers; or the piping group combined with instruments.

Nature of their work

The work of the pumps, compressors and drivers group, the instruments group, and the insulation, fireproofing and painting group is primarily selection and specification of the types, sizes and makes of the particular items of equipment and materials for which they are responsible; such information they send along to the purchasing department for procurement. This is also true in many cases for the work of the furnaces group, the exchangers, coolers and condensers group, and the vessels, towers and reactors group. In some cases, however, the latter groups engage in considerable design as well as selection and specification. The work of the foundations, structural steel, buildings, and piping groups is primarily design, in which is included the take-off or bills of materials. The work of the electrical group is partly design and partly specification.

Cross reference essential

The interdependence of these groups upon each other has been already mentioned, and is clearly seen by an inspection of the double-page schedule.

In particular, systematic and close cross-reference must exist between the piping group and the groups for furnaces, exchangers-coolers-condensers, vessels-towers-reactors, pumps-compressors-drivers—every group whose equipment will have nozzles or other openings to which the piping is to be connected. If this is not maintained, there will result an excessive number of differences between the sizes and series of the equipment opening flanges and the sizes and series of the connecting piping flanges. The consequences will be drawing changes, forced use of adapters, more joints, etc. Systematic and close cross-reference must also exist between the structural steel group and the groups for foundations, buildings, piping, and equipment in order to assure the desired clearances, proper locations of supports, etc. Similarly, in general, for all groups.

The fine sub-division of the groups into separate, highly specialized sections is customary

in a very large company working on a number of large jobs, and confers certain advantages; on the other hand, it tends to increase the chances of error through lack of complete, detailed cross-reference. The medium sized company, working on only one large job, or on medium sized jobs, can in this respect enjoy the advantage of combining groups, as for example, the combination of the foundations, structural steel, and buildings groups into one section.

Work of Purchasing Department

(a) Inquiries and quotations

As the purchasing department receives the necessary information from the various engineering groups, it prepares and submits inquiries to manufacturers and vendors for bids. In some instances the engineering department or the process industry firm will inform the purchasing department that because of special design or construction features, or on the basis of past experience in the field and acquaintance with operating performances, only certain makes of equipment are acceptable.

Dates for receipt of quotations from the manufacturers and vendors are agreed upon in advance; these are important dates as indicated in the schedule.

Analyses of quotations, especially for the major items, are usually joint efforts by the purchasing department, engineering department and the process industry firm. Prices, dates of delivery, and conformance to specications all play their parts in the selection of the successful bidders.

(b) Orders

The successful bidders having been chosen, the purchasing department proceeds with the official placement of orders. It must strive to place these orders on or before the dates shown in the schedule for that purpose (solid blocks).

At the time the orders are placed, the purchasing department must obtain verification from the manufacturers of the expected fabricating and delivery periods, which must fall within the periods shown in the schedule.

The determination of the financial reliability of the manufacturer, and arrangements for dates and amounts of payments, are obligations of the purchasing department.

If the purchasing department is under the consulting and engineering company instead of the process industry firm, it becomes responsible for arrangements regarding receipt of funds—dates and amounts—from the process industry firm, to be used by the purchasing department in payments for the equipment.

As orders are placed, copies of order sheets are distributed to the project managers' assistants for checking and as information on the progress of purchasing.

(c) Inspection

The extent of inspection required at fabrication shops is usually determined by agreement between the consulting and engineering company and the process industry firm; except in those instances where either alone shoulders complete responsibility for conformance of the manufactured equipment to the requirements, in which cases the choice is of course that of the responsible party. The presence of an inspector at the premises of the fabricator—provided the inspector is properly experienced and has his share of common sense—is bound to have a psychological effect on the fabricator's artisans that will be beneficial to the purchaser. Furthermore, there is room for honest differences of opinion, or two ways of performing a specific task, either of which is equally acceptable in general but one of them preferred by the purchaser, and that preference not clearly expressed in the written instructions or specifications. In all such cases, considerable time is saved by the presence of the inspector on the spot.

(d) Expedite drawings, shipments, traffic

(1) Drawings

The importance of getting manufacturers' drawings and details on the dates designated in the schedule cannot be over-emphasized. Unless they are received on time the work of a complete group may be held up; and with its work held up, that of related groups soon becomes involved in the slow down.

The inspector of fabrication may also double as the expeditor.

(2) Shipments

Expediting shipments means primarily expediting the completion of fabrication.

As may be seen from the schedule, the shipments of all equipment and materials must be made on specified dates in order that the construction completion dates be met. It is sometimes inadvisable to have equipment and materials arrive at the site ahead of time; but the danger of their arrival behind time is far more real and far more important.

The manner in which the purchasing department can expedite shipments depends largely on its being apprised in adequate time of an approaching possible delay. Numerous occasions arise in fabrication where exact conformance to specifications will involve delay, and where exceptions may be acceptable. Thus, the fabricator of vessels may find there is going to be difficulty in getting certain manhole nozzles on time, but he can get nozzles one size smaller on time. The purchasing department, on being properly informed, may be able to procure the required nozzles for the fabricator from some other source, or, after quick conferences with the engineering department and the representative of the process industry firm, it may be decided that manhole nozzles one size smaller are not as bad as a delay.

(3) Traffic

Assistance to fabricators in traffic routing will sometimes arise from the familiarity of the purchasing department with shipments from different fabricators' plants to the same site, when it may be possible for one fabricator to help another, especially if the plants are on the same route to the site or are located not too far from each other. The familiarity of the process industry firm with traffic conditions in its own area may also be of value to fabricators.

(e) Accounting

All records of receipts, expenditures, time charges, etc., on the project fall within the province of the purchasing department, unless there is an accounting department that is independent of the purchasing department.

(f) Check estimating

As the job progresses, check estimates must be made at frequent, regular intervals, comparing actual expenditures for equipment, materials, engineering charges, construction charges, etc., with the costs estimated at the beginning of the job. Inspection of these estimates by the process industry firm will depend on the type of contract under which the project is being executed (cost plus, turnkey, etc.). Discussion of the different types of contracts is of course related to the subjects of this report, but because of the breadth of the topic of contracts and the large amount of published information on it, has been considered outside this report's scope.

Installation and Construction

The degree of success in the installation of equipment and construction of plant will depend largely on four factors: (a) the accuracy and adequacy of the design engineering; (b) the delivery of equipment and materials to the site in accordance with specified schedule dates, and in good condition; (c) the competence of the construction force; (d) luck.

(a) Good design

The accuracy and adequacy of the design engineering relates, in this instance, chiefly to the avoidance of interferences and to the completeness of drawn and written instructions. Piping interferences are perhaps the most annoying of this type of error. In a period of rush and stress in the drafting room, some revisions may not have been properly checked; inspection of the drawings in the field cannot be expected to disclose every drafting room error; and only after two crossing lines are erected and approaching each other may it be discovered that the clearances are not quite adequate. This doesn't happen often, but once in a while is still too costly for the construction department. Incompleteness of drawn and written instructions will result, at the best, in time lost in long distance phone conversations between the construction and engineering departments, and, at the worst, in mistakes in construction.

(b) Good deliveries

The delivery of equipment and materials to the site in accordance with specified schedule dates, and in good condition, grows gradually more and more important because of increased specialization and sub-division of tasks among skilled and unskilled labor, and increasing rates of hourly pay. For example, a group of electricians, idle because needed conduit or parts were not delivered on schedule, cannot turn a hand to help the pipe fitters or painters; they have no alternative but to wait. The construction force itself has no control over the delivery of equipment and materials to the site on time; this is the joint responsibility of the purchasing department, the manufacturers, and the engineering department.

(c) Good constructors

The competence of the construction force is a matter which is self evident. Practices for recruiting, training, directing and holding competent construction men are not covered in this report.

(d) Good luck

By luck is meant freedom from unforseen and unavoidable natural disturbances, such as extraordinarily heavy storms, unusually early frosts, etc., and from uncontrollable strikes or other labor difficulties in the field or in the fabricators' shops.

Initial Operation

The plant having been completely erected, it will be made ready for operation by testing all equipment and lines, and by 'hooking in' the plant connecting utilities. The initial operation may be supervised, or entirely conducted, by the consulting and engineering company or by the process industry firm, depending on earlier understandings and arrangements.

Complete and clear written instructions for both testing and operating will be available, usually, from the consulting and engineering company.

The time required to place the plant into satisfactory operation will of course be related to its complexity and novelty. A plant that is identical or quite similar to one previously built, and operating on an established process, should go right off. A plant differing in numerous respects from any previously erected, or operating for the first time on the particular process (i.e., the first time the process is put into commercial scale operation), may take days, weeks or even months before all bugs are eliminated.

Good-by

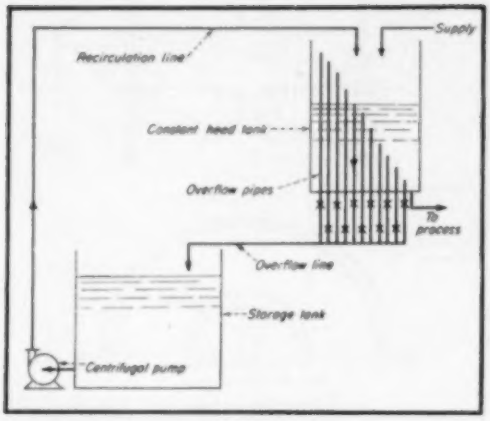
With the satisfactory operation of the plant —production at the required capacity, products at desired quality, costs of operation within those estimated—it is completely and finally turned over to the owner.

IF YOU ARE PLANNING A NEW PLANT, TURN BACK. Turn back and read carefully this Report on Project Engineering. Especially, turn back if yours is a medium sized company—full of confidence, ready to expand—but not an old hand at building plants. This report is written for you (the big companies know the ropes—the small ones, their limitations). It is the in-between company, prospering and feeling its oats, which too often has bitten off more than it could chew—which didn't know what it was getting into and had an expensive time getting out. This blow-by-blow account of an actual project is intended to impress you with the enormity of the project manager's job. It will help you avoid mistakes, or better perhaps, persuade you to talk it over with a competent engineering firm—a firm whose very business is the efficient production of plants, even as yours is the efficient production of chemicals.—

Editors.

The Plant Notebook

THEODORE R. OLIVE, Senior Associate Editor



Liquid Feeder for Varying Quantities of Slurry

SHELDON JACOBS, *Chemical Engineer, City of Chicago, Division of Water Purification*

★ **January Contest Prize Winner**

It is often necessary to feed slurries or heavy suspensions at a constant, controlled rate, and to be able to change the rate at will. Such service imposes a difficult problem on most feeding devices—regulating valves, for example—since the solids tend to clog usual types of feeders.

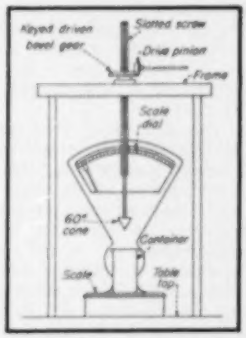
In the sketch above is a new version of the old constant-head tank which has a number of advantages. Usual methods require a pump with a variable-speed drive, which is both more expensive and more troublesome than the centrifugal pump used with the constant-head tank. Since the arrangement shown recirculates the slurry continuously, it provides excellent agitation and prevents settling of the solids.

The tank contains a number of overflow pipes all connected to a common header leading back to the storage tank. Since the lengths of the various overflow pipes vary, and each is provided with a gate valve, any desired level can be held in the tank, thus putting any desired head on the outlet leading to the process. The closeness with which the appropriate level can be held depends only on the number of overflow pipes provided. By the same token, the number of possible discharge rates depends only on the number of overflow pipes.

The system can be calibrated experimentally for delivery rate at each available head, or the discharge can be calculated if the various constants are known. A variation of the idea that is even more adjustable is to use a swing pipe for the overflow instead of the multiple overflow pipes.

Rotary Consistometer Measures Flow Properties of Suspensions

NEO S. SERINIS, *Kaylo Div., Owens-Illinois Glass Co., Berlin, N. J.*



When a liquid is mixed with one or more insoluble solids, the liquid is rendered less fluid without actually changing the physical characteristics of either the liquid or the solid. This is due to the fact that, in order to cause flow, the liquid must carry the solid particles along with it, thus causing a retardation of the flow or spread of the liquid — solids mixture. Therefore, in handling, molding, casting, or placing such mixtures, it becomes very desirable to be able to evaluate their flow properties and regulate them to conform to the requirements of the various operations in their manufacture.

The apparatus shown here, although designed and developed to measure the consistency of a lime, silica and asbestos slurry, can be used with equal proficiency in

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• FEBRUARY PRIZE WINNER—A $50 prize will be issued to . . .

GEORGE T. AUSTIN
Associate Professor of Chemical Engineering, The State College of Washington, Pullman, Wash.

. . . for an article describing a simple wire scraper for belt conveyor unloading which works perfectly whether the belt is crowned or troughed. It is inexpensive and results in little belt wear. The article will appear in our April issue.

$50 PRIZE FOR A GOOD IDEA—Until further notice the Editors of *Chemical Engineering* will award $50 cash each month to the author of the best short article received that month and accepted for publication in the Plant Notebook.

The winner each month will be announced in the issue of the next month, e.g., the March winner will be announced in April and his article published in May. Judges will be the Editors of *Chemical Engineering*. Non-winning articles submitted for this contest will be published if acceptable at usual space rates.

HOW TO ENTER CONTEST—Any reader of *Chemical Engineering*, other than a McGraw-Hill employee, may submit as many entries for this contest as he wishes. Acceptable material must be previously unpublished and should be short, preferably not over 300 words, but illustrated if possible.

Articles may deal with any sort of plant or production "kink" or short-cut that will be of interest to chemical engineers or others in the process industries. Also, novel means of presenting useful data, as well as new cost-cutting ideas, are acceptable. Address Plant Notebook Editor, *Chemical Engineering*, 330 West 42nd St., New York 18, N. Y.

many other processes where mixtures of solids and liquids are handled in a similar manner.

The principle of the apparatus consists in the measurement (in grams) of the resistance offered when a solid body is caused to travel through the slurry under investigation.

As the sketch shows, the apparatus consists of a scale, a cone attached to a long screw stem, a supporting frame for the cone, and a drive mechanism.

The scale is a double platform scale with a dial indicator in the center. (The platform at the rear of the scale is not shown in the sketch.) When the container holding the sample is placed on the front platform, weights are added on the rear platform to tare the sample and the container by bringing the indicator on the zero mark of the dial. A convenient way is to use small lead shots for counterweights, as they are easily added or taken away.

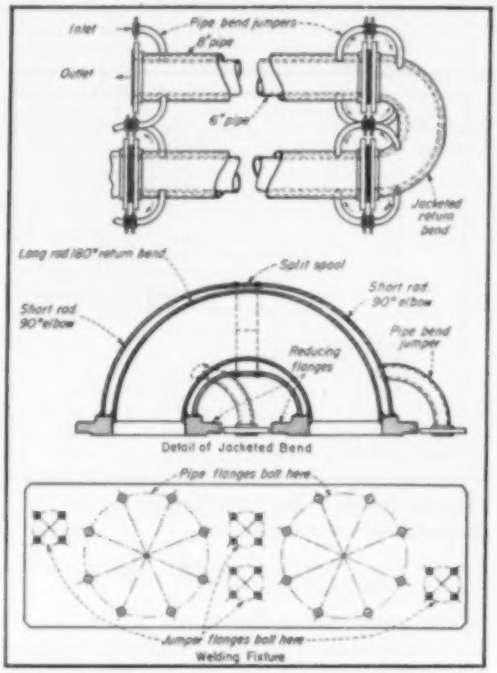
The drive pinion can be operated manually with an appropriate handle attached to the drive shaft. However, a more satisfactory way is to connect to the drive shaft a small motor with a reversing switch and a speed reducer. The driven bevel gear rotates in a stationary retainer. A key fastened in the bore of the gear fits the slot in the screw stem with enough clearance to slide freely up or down. When the bevel gear is rotated, therefore, it rotates the screw shaft and at the same time causes it to move up or down as desired.

The following sizes and dimensions have been found convenient to cover a variety of fields of investigation: For the scale a capacity of 20 kg. with dial graduations of 1 gram; for the container a size of 4½ in. diam. by 10 in. tall; for the cone a base diameter of 2¼ in., a volume of 60 cc. and an angle of 60 deg. Cone speed is 60 rpm.

The selection of these sizes and dimensions was the result of considerable experimenting to discover the most favorable conditions for obtaining consistent results. The rotary motion of the cone prevents larger particles of solids from adhering to the cone, thus increasing the resistance and interfering with the proper evaluation of the consistency. As the cone rotates in its downward movement, the particles are brushed aside gently and are thus prevented from adhering to the cone surface. The pressure registered on the scale is therefore the force required to dislodge the particles in the liquid medium in conformity with the shape and the speed of the plunger. The denser the particles in suspension, the greater is the force required to depress the plunger. This then provides a means of evaluation of the consistency of the material under investigation.

To operate the apparatus, fill the container with the sample and place it on the front platform of the scale. Add weights on the counter-platform until the indicator on the dial rests on zero. Make sure the container is concentric with the cone. Then start the cone on the downward movement. Watch the dial as the cone enters the container. The indicator will begin to register the weight. This will increase progressively until the cone is completely immersed. When further depression of the cone shows no increase in weight, the maximum friction load is attained.

It will now be necessary to make a deduction from this weight to obtain the actual net amount of pressure exerted by the resistance of the solid particles to the progress of the cone in the sample medium. This correction is related to the volume of liquid displaced by the immersion of the cone. In order to determine this weight, it is necessary to know the approximate specific gravity of the material being tested. This can very easily be determined by weighing a measured volume of the sample. The volume of the cone, multiplied by the specific gravity, and subtracted from the total weight recorded, will give the consistency in grams of the material under investigation.



Jacketed Pipe Easily Fabricated For Heating Process Liquids

E. A. Weber, *The Barrett Div., Allied Chemical & Dye Corp., Frankford, Philadelphia, Pa.*

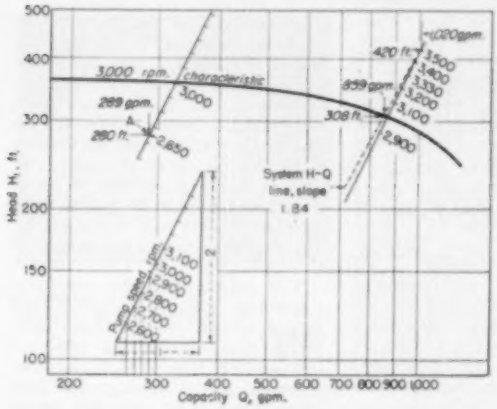
Diagrammed above is a system for jacketing pipe that has been devised to do away with the disadvantages usually encountered with this type of construction. Such disadvantages usually include: (1) Cold spots at the flanges; (2) high costs for materials and labor involved in swaging the jacket pipe to meet the inner pipe, and the welding of the two together; (3) high materials and labor cost for fabricating the steam and condensate "jumpers" from standard fittings; and (4) lack of interchangeability of the sections.

The topmost portion of the drawing shows two sections of jacketed pipe connected by a jacketed return bend. The middle section illustrates how the return bends (or other fittings) are fabricated. The bottom sketch indicates the construction of a simple fixture used in fabricating the bends and in attaching the jumpers.

Straight lengths of pipe are assembled using standard reducing flanges. In the case shown, they accommodate a 6-in. inner and an 8-in. outer pipe. The return bends are made from standard welding fittings of like size, welded to similar reducing flanges. The outer or jacket fittings are split to permit installing around the inner fitting, later being welded closed.

All fittings are fabricated on the fixture by first bolting

the flanges for both pipe and jumpers at the proper points on the fixture. They are first tack-welded, then fully welded. The jumpers are made from bent pipe and standard flanges. All parts are thus interchangeable and assembly can be accomplished in a fraction of the time necessary when the pieces are fabricated individually without the fixture.



Graphical Method Simplifies Centrifugal Pump Calculations

FREDERICK CARR, *Engineer, Sarnia, Ontario, Canada*

Calculations involving speed changes of centrifugal pumps and blowers can be greatly simplified by the use of a graphical method based on plotting the head-capacity characteristic curve on logarithmic cross-section paper.

The method derives from the laws connecting the head H and capacity Q with the speed N. These laws are: $H_1/H_2 = (N_1/N_2)^2$ and $Q_1/Q_2 = N_1/N_2$, where H_1 and Q_1 are the head and capacity corresponding to a point on the characteristic curve at speed N_1, and H_2 and Q_2 are the head and capacity coordinates of a related point on the curve at speed N_2.

If we combine the two equations it is evident that all related H-Q combinations at varying speeds lie on a straight line of slope 2 when the characteristic curve is plotted on log paper. Furthermore, the linear distance between any two such points, measured on a logarithmic scale, is directly related to the speeds corresponding to the points.

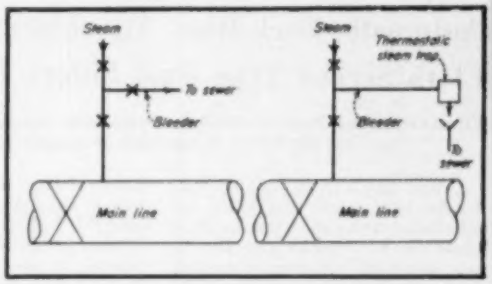
The chart above shows how these facts can be used for the graphical solution of pump problems. The curve given here is for a centrifugal pump running at 3,000 rpm. A movable right triangle, with sides in the proportions of 2 to 1 (slope = 2), is graduated along the hypotenuse as indicated on the chart, with the graduations taken from the Q axis. The hypotenuse now fulfills the conditions noted in the previous paragraph, in that the speeds marked on it correspond to various related H-Q combinations which lie on a line of slope 2. The triangle can now be used in conjunction with the plotted characteristic curve, to give direct solutions to problems which ordinarily require trial and error.

Problem 1—At what speed must the pump run to deliver 289 gpm. at 280 ft. head? These H-Q conditions correspond to point A on the chart. Place the triangle so that its short side is parallel to the Q axis, its hypotenuse passes through point A, and its 3,000 rpm. mark falls on the characteristic curve. The required pump speed, read on the hypotenuse at point A, is 2,650 rpm.

Another class of problem, which involves the head-capacity curve of a process system, can also be solved readily with the triangle. When a pump is used to deliver liquid through a pipe system, the quantity pumped is fixed by the intersection of the pump H-Q curve, with the H-Q curve for the system. Head-capacity curves for a piping system plot on log paper as straight lines, with the slope determined by the character of the flow or system. For Case 1, with turbulent flow in a piping system, the slope is 1.84. For Case 2, where impact or turbulence provide the main resistance—as in an orifice mixer—the slope is 2. For Case 3, with flow in the streamline region in a piping system, the slope is 1.0. Most problems of industrial importance fall in Case 1 or Case 2. If the flow is transitional or intermediate, several points should be calculated and plotted to locate the system head-capacity curve.

In usual cases, a single point on the system head- capacity curve can be found easily from operating data. Then, if the slope is known, the head-capacity line for the system can easily be drawn. As an example:

Problem 2—The pump is running at 3,000 rpm. and is delivering 859 gpm. through a piping system of the type of Case 1. What volume would be delivered by increasing the speed to 3,500 rpm? Locate the present operating point on the 3,000 rpm. curve and draw a line through it with a slope of 1.84. Then place the triangle with its base line parallel to the Q axis so that the 3,000 rpm. curve intersects it at the 3,000 rpm. graduation, while the system head-capacity line intersects the hypotenuse scale at the 3,500 rpm. graduation. The quantity then read off at 3,500 rpm. on the scale is the predicted delivery at the new pump speed.



Improved Piping Connections for Blowing Out Process Lines

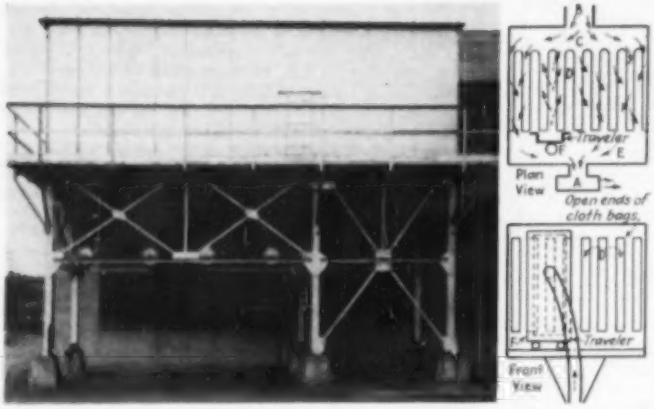
ROBERT L. MILLER, *Kamen Soap Products Co., Barberton, Ohio*

In using steam to blow out lines, as is done in many industries, the usual piping arrangement is that shown in the lefthand sketch above. However, human nature being what it is, the bleeder line is generally not left open after use, which means that a leaky steam line will permit steam to blow continuously into the product line. Instead, the product may suck back into the steam line in case the header is shut off.

A better arrangement, which will be found useful in a good many cases, is shown in the righthand sketch. Here a thermostatic steam trap is used instead of a hand operated valve in the bleeder line. When properly installed, the trap will act like an automatic valve. To make sure that a small trickle will not close it, it should be some distance from the steam connection. Also the bleeder should always be placed so that it can not suck water back from the sewer.

Process Equipment News

THEODORE R. OLIVE, Senior Associate Editor



At left, typical cloth screen dust collector of type to which new Dynaclone blow-back cloth cleaner can be added; at right, plan and elevation sketches showing how traveller blanks off group of bags, admitting reverse flow of atmospheric air to dislodge dust.

Automatic Back-Blow Attachment Cleans Cloth Screen Type Dust Filters (140a)

Eliminating mechanical shaking, Dynaclone can be added to either new or old filters to maintain constant peak performance

A new back-blow method for cleaning flat cloth screen dust filters, just introduced under the name of Dynaclone by Sly, enables the filter to maintain peak performance continuously, eliminates bag shaking. This gives longer bag life and makes it unnecessary to shut the collector down periodically to remove the accumulated dust from the bags. Since cleaning of the individual bags can be accomplished at frequent intervals, and since all but three bags are operating at all times, the suction at the dust source remains constant and thus gives more favorable conditions at the dust producing equipment than are possible with the old, discontinuous cleaning method.

The new development consists in adding a "traveller" within the collector housing on the clean air side (suction side), which moves along continuously, blocking off the open ends of three bags at a time. In the upper sketch, fan *A* creates a suction in the entire system, from the dust source, through pipe *B* to dust chamber *C*, through the filter bags *D*, and into the clean air chamber *E*. The traveller *F* is connected by a flexible tube to the outside air. Thus, when the traveller is blocking off a group of three bags, outside air at atmospheric pressure enters through *F*, passes through the walls of the center of the three bags in the reverse direction, and into the chamber *C*, which is under suction. This dislodges the dust from the center bag, and because the two bags flanking it are not under suction, the dust drops into the hopper.

According to the manufacturer the Dynaclone can readily be added to existing equipment of the same make.

The W. W. Sly Manufacturing Co., 4700 Train Ave., Cleveland 2, Ohio.

FAST, NOISELESS:

Water Heater (140b)

Hot water, from mixed steam and cold water, can be made in large quantities in a small unit by means of the Hy-Flow heater produced by A. Gunthard Co. The unit is of a type which has been long and successfully employed in Europe, but is just now being introduced into this country. Constructed to code requirements for 150-lb. working pressure, it operates on the principle of breaking the respective flows of water and steam into a large number of paths. This is accomplished by passing them through a packed bed. The units are produced with capacities from 3,960 to 31,500 gph.

This company has also introduced a new line of carbon-steel, lead-lined flanged fittings, which includes most fitting types. These are produced in pipe sizes from 2 to 12 in. The lining is of the homogeneous type which is said to be inseparable except at temperatures approaching the melting point of lead.

A. Gunthard Co., Ennis, Tex.

LOWER POWER, FASTER:

Side Drive Pulper (140c)

To provide paper manufacturers with faster pulping, lower power consumption, and more thorough defibering, Cowles Co. has developed the new side-drive pulper illustrated above. This machine employs a small, fast-running impeller which is partially shrouded by a member somewhat resembling part of the volute of a centrifugal pump. This construction provides for general circulation within the tank at all ordinary consistencies and at the same time is said to increase pulping efficiency. A pulper with a capacity of 1 ton per batch is said to do an excellent pulping job in 10 min. with 75 hp. For com-

plete defibering twice the power, and from 10 to 30 min., is required. To provide for turnover as well as circulation, the tank departs from a circular shape, while the impeller also imparts a lifting motion.

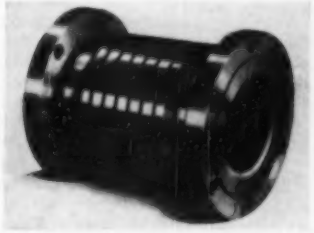
The Cowles Co., Cayuga, N. Y.

SIMPLIFIED CONSTRUCTION:

Novel Homogenizer (141a)

Elimination of many parts customarily used in high-pressure homogenizers, such as crankshaft, connecting rods, and crosshead guides, is a feature of the Logeman Hydropulse Homogenizer. The design is simple and rugged and employs a floating piston which requires no packing. The mechanism is encased in a bath of oil, hermetically sealed to prevent contact between the mechanism and the product being handled. The unit is said to be self-priming and to have a capacity of 50 gph. with a motor of ¾ to 1½ hp. depending on pressure and capacity required.

C. W. Logeman Co., 633 Bergen St., Brooklyn 17, N. Y.



FOR HIGH PRESSURE:

Expansion Joints (141b)

For working pressures in the 1,000 psi. pressure range, the new Flexoniflex line of expansion joints announced by Chicago Metal Hose provides for axial, offset and radial motion control in high-pressure piping systems. These joints consist of corrugated bellows-type sections of stainless steel or other alloys formed within integral control rings and end sections. Unlike the control rings normally used on controlled-flexing expansion joints, the rings of the new units are not bolted in place, but have intimate relationship with the pressure carrier. This feature, plus the design of the convolution wave and other factors in the design, is claimed to permit these units to withstand extremely high pressures. Units range in size from ¾ in. I.D. up, for temperatures from sub-zero to 1,400 deg. F., or even higher.

Chicago Metal Hose Corp., Maywood, Ill.

SPEEDS HANDLING:

Drum Lifter (141e)

A new power truck attachment designed specifically for handling steel drums is now produced by Elwell-Parker. The device comprises a steel frame with base, attached to the elevating mechanism of the truck's upright column. In the center of the foreward upper cross member is an adjustable hook. In operation this hook engages the upper chime of the drum, enabling the truck driver to tilt it backward. At the bottom are two short forks, each with a groove conforming to the drum contour, which slide under the lower chime as the drum is tilted. The truck attachment is said to be particularly useful for stacking drums on pallets for transportation or tiering with other fork trucks.

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

Marshall and Stevens Indexes of Comparative Equipment Costs

(1926 = 100)

Compiled quarterly for March, June, September and December of each year by Marshall and Stevens, evaluation engineers, Chicago and Los Angeles. Indexes are prepared for 47 different industries, from which the eight process and four related industries listed here are selected. Published each month with the latest available revision. For a description of the method of obtaining the index numbers see R. W. Stevens, **Chemical Engineering**, Nov. 1947, pp. 124-6. For a listing of annual averages since 1913 see **Chemical Engineering**, Feb. 1949, p. 129.

Industry	Dec. 1948	Sept. 1949	Dec. 1949
Average of all.....	166.0	159.6	159.4
Process Industries			
Cement mfg.	159.8	155.9	155.2
Chemical	167.8	163.4	163.3
Clay products	154.8	150.4	150.3
Glass mfg.	157.9	152.5	152.4
Paint mfg.	161.1	156.7	156.6
Paper mfg.	161.4	157.0	156.9
Petroleum ind.	164.2	159.8	159.7
Rubber ind.	166.6	162.2	162.1
Process ind. avg....	165.2	160.9	160.7
Related Industries			
Elec. power equip...	169.4	165.0	164.9
Mining, milling	168.5	164.1	164.0
Refrigerating	181.2	173.9	173.6
Steam power	156.5	152.1	152.0

TWO-PIECE CONSTRUCTION:

Aluminum Drum (141d)

Benson Mfg. Co. of Kansas City has completed an arrangement with Kaiser Aluminum & Chemical Sales to

(Continued)

More Information . . .

To find out more about any of this new equipment, check the item's number on the Reader Service Postcard inside the front cover.

This Month . . .

Well, here it is March again and time to start thinking with the slant of spring, rather than with the drab inevitableness of the winter that is almost past. Time to get a little imagination into our process thinking, too. For a starter, let's give a little thought to that 2,200-deg. F. gas turbine on page 142. It's experimental, to be sure, but that temperature means a lot higher economy than any gas turbine that has gone before . . . Or give a little thought to the novel twist in vibration balancing you will find in that vibrating conveyor that appears on page 144 . . . Again, how about the use of selected radiation wave lengths for heating in the new freeze dryer announced on page 146 . . . And page 148 may give the clue to a successful solution of your semi-continuous bulk weighing needs if accurate solids weighing is one of your problems.

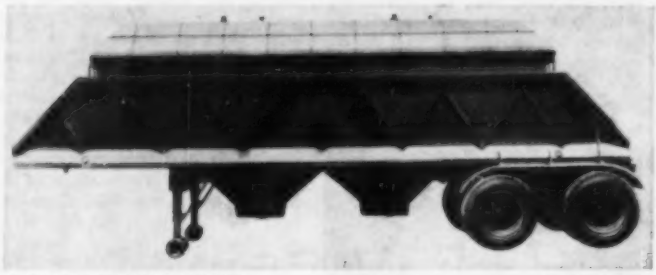
Next Month . . .

To whet your curiosity we'll mention that a brand new principle in dust collection equipment will be disclosed—not a filter, not a cyclone, not an impingement device, not electrical . . . And another why-didn't-I-think-of-that-myself, that gets something like six times the performance out of contacting columns of the same overall dimensions!

market its aluminum drums for the chemical industry. A new addition to this line is a 55-gal drum, Model A945, which is made of two drawn one-piece aluminum shells with an outer circumference weld, designed to meet Rule 40 Consolidated Freight Classifications. The drum is fabricated from ¼ in. 52S aluminum plate, having a tensile strength of 31,000 psi.

The line also includes another 55-gal. drum, Model A908, designed particularly for nitric acid. Other drums of capacities of 15.5 gal. through 55 gal. are available.

Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, Calif.



DRY CHEMICALS BY ROAD **(142e)**

Many dry chemicals such as soda ash, lime, sulphur, fertilizers and plastic powders can readily be transported over the road in hopper-bottom dump trailers of the type now being produced by Gramm. The design is weatherproof, providing for loading through manhole openings and discharge through hoppers in the bottom. —Gramm Trailer Corp., Delphos, Ohio.

LONG LIVED:

Elevator Chains (142a)

Increase in service life of more than 20 times, compared with malleable iron chains, is claimed for the new Beaucalloy elevator chains offered by Beaumont Birch. These chains are of a special heat-treated alloy steel with special design features, including a projecting guard which deflects material from the chain joints, slotted boss ends which prevent the pin from rotating and protect the cotter pin from wear, as well as alloy steel centerless-ground connecting pins, and other features. The links are designed to fold into place on the sprocket with a minimum of friction and wear on the link surfaces.

Beaumont Birch Co., Philadelphia, Pa.

WORKS AUTOMATICALLY:

Rejection Meter (142b)

Quality control can be mechanized with a new quality control indicator brought out by GE. The instrument is an electrical computer which keeps an automatic, continuous check on rejection rates in manufacturing operations and automatically makes a statistical analysis of the production and rejection rates, indicating on the meter whether the percentage of rejections is above or below an acceptable level. Although the device is intended primarily for mechanical goods assembly lines, it should be equally valuable in analyzing the results of packaged chemicals inspections. The indicating equipment can be set up at any point. An electric eye counts production, while each time an inspector rejects a unit, he pushes a button, feeding a "rejection" impulse into the computer.

General Electric Co., Schenectady 5, N. Y.

HIGHLY ACCURATE:

Level Indicator (142d)

Instruments of two different types, both capable of reading liquid levels to 0.01 in. of liquid head, are being produced under the name of Levlocator by the Asch Equipment Co. One type, an electrical or electronic finder, seeks out the level of liquid in a tank or other vessel, the same mechanism operating a direct reading indicator to show the liquid height above a preselected datum point. The second type employs a manometer having the same sensitivity and accuracy but giving values which must be multiplied by the density ratio of the manometer liquid to that of the stored liquid. The first or direct type offers greater volume accuracy, enabling changes of only 1 gal. to be shown in a 10-ft. diameter tank. The second, essentially a weighing instrument, is used similarly to other manometers, but offers both closer reading and indications on an indicator of the digital type, requiring no interpolation of scale divisions.

Asch Equipment Co., 98-11 Queens Blvd., Forest Hills, N. Y.

HIGH TEMPERATURE:

Special Gas Turbine (142e)

A recent announcement from Kennametal, Inc., states that this concern is now building a 200-hp. demonstration gas turbine to operate at the extremely high temperature of 2,200 deg. F. Important parts will be made of this concern's unique heat-resisting material, Kentanium, and the turbine is being built to demonstrate the potentialities of this material to prospective turbine builders. The construction material is said to have high resistance to oxidation and to retain unusually great strength at elevated temperatures, withstanding thermal shock and yet weighing much less than conventional heat-resistant materials. The high temperature at which the turbine will operate is expected to give much greater efficiency and therefore permit maximum horsepower to be developed in a lighter, more compact unit than heretofore possible.

Kennametal, Inc., Latrobe, Pa.

DISCHARGE CONTROLLED:

Improved Centrifugal (142f)

Improvement in its line of valve-bowl centrifugals has resulted in the announcement of the new Model DV-2 machine by Sharples. This machine is of the disk type, having 10 solids-discharge valves located radially around the inside of the bowl. These valves are controlled externally

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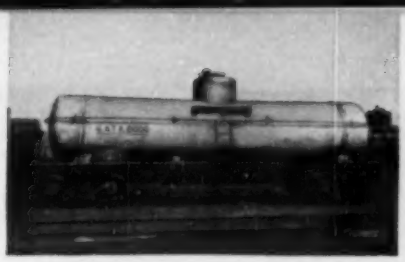

The first aluminum tank car ever built was produced by General American in 1928. It was GATX 8000—built specifically for Glacial Acetic Acid.

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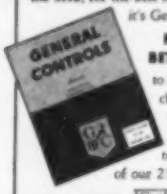

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by the admission of water or other operating liquid through a separate channel of the machine. Since both frequency and duration of valve opening are precisely adjustable, the machine permits control over consistency of solid while it minimizes loss of mother liquor with the solids and increases scope of application among troublesome materials such as flocculent suspensions and slimes. The machine is available either as a separator or clarifier. While it is generally controlled by an external timer, it also may be operated by process control instrumentation.

The Sharples Corp., 2301 Westmoreland St., Philadelphia 40, Pa.

REDESIGNED LINE:

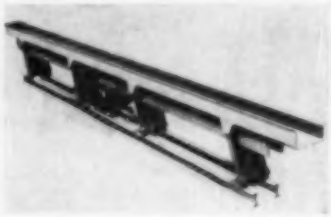
Refrigeration Compressors (144a)

A new line of ammonia refrigeration compressors to handle from 15 to 275 hp. equivalent of refrigeration has been announced by York Corp. These machines, termed V/W compressors because of the cylinder arrangement, are said to have almost indefinite life because cylinder liners and other parts subject to wear can readily be replaced with a minimum of effort at low cost. Complete static and dynamic balance eliminates need for special foundations. Design is compact, requiring less floor space and room, while starting power requirements are reduced by automatic cylinder unloading. These units come with 4, 6, 8, 12, or 16 cylinders, for direct connection to the motor.

York Corp., York, Pa.

SUB-MICROSCOPIC FILMS EXAMINED (144b)

New lubricants and catalysts are being developed by California Research Corp., Richmond, Calif., using GE's electron diffraction instrument, which can "see" film surfaces as thin as two millionths of an inch. This instrument is the most sensitive yet developed for observing chemical and physical changes in extremely thin films. It is claimed to present a truer evaluation of surface active materials than is possible by other methods, such as X-ray defraction or chemical analysis.—General Electric Co., Schenectady 5, N. Y.



MECHANICALLY VIBRATED:

Trough Conveyor (144c)

In its new type MV mechanically vibrated conveyor, Jeffrey has employed a new system of balanced forces so designed that vibration is almost completely isolated from the foundation. The conveyor consists of a conveyor deck mounted on cantilever spring bars, below which is a counterweight also mounted on cantilever spring bars. The counterweight beneath each conveyor deck vibrates in the opposite direction from the deck section so that horizontal and vertical forces at the mounting points are equal and opposite, cancelling each other out.

Natural frequency of the machine is close to the speed of the eccentric drive. The motor driving the eccentric shaft simply maintains the balanced forces in the system and little power is required to operate the conveyor, according to the manufacturer. Each drive unit operates two equal lengths of conveyor, with up to 80 ft. of conveyor operated from a single drive unit. The conveyor can handle materials uphill, downhill or horizontally carrying up grades as steep as 10 deg. No special foundations are required.

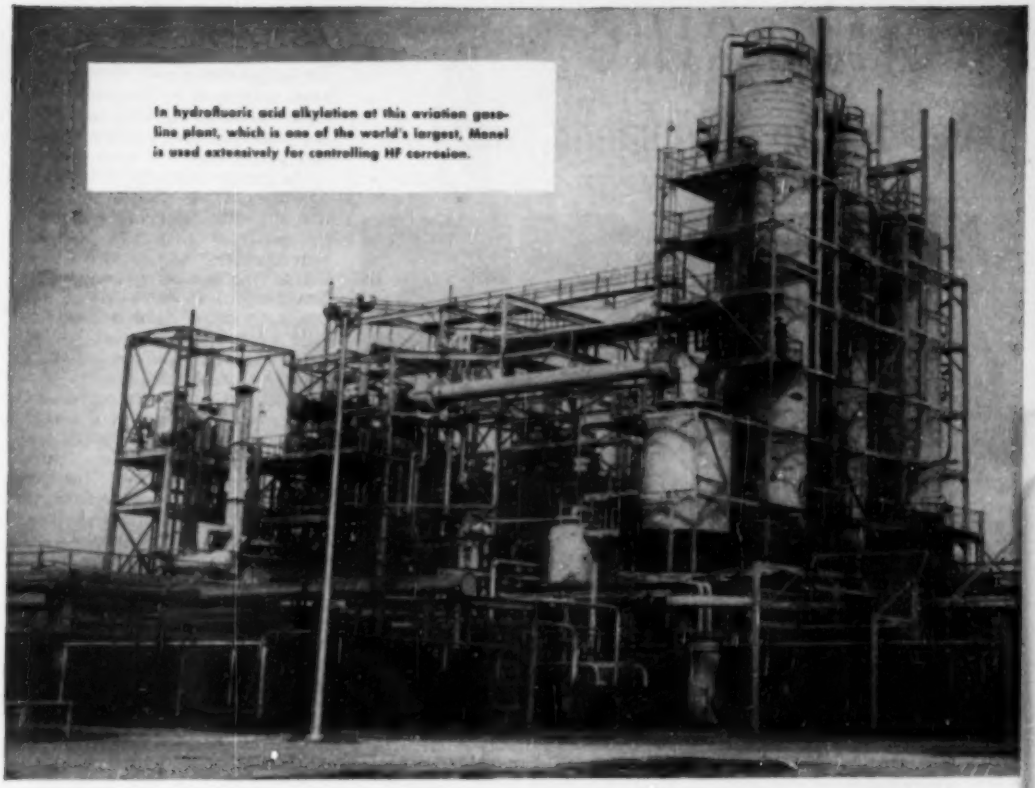
The Jeffrey Mfg. Co., Columbus 16, Ohio.

CLEANS OUT SCALE:

Channel-Switch Evaporator (144d)

For evaporator applications where scale deposits because of inverse solubility of dissolved salts, General American is now producing a new Conkey evaporator licensed under the Swedish Rosenblad patents. The system has had a thorough trial in Scandinavian sulphite mills where it has been found that the heavy deposit of

(Continued)



In hydrofluoric acid alkylation at this aviation gasoline plant, which is one of the world's largest, Monel is used extensively for controlling HF corrosion.

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Experience has proved that for maximum safety, and corrosion resistance, Monel® is among the most satisfactory materials of construction for handling fluorine and its more active compounds.

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Not only is Monel highly resistant to attack by fluorine, it also shows good corrosion resistance to anhydrous hydrogen fluoride and to steam-HF mixtures, even at temperatures as high as 1100°F. A proven practical application of these facts has been the established use of Monel in hydrofluoric acid alkylation units in petroleum plants.

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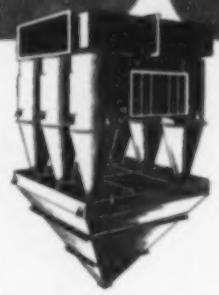

Merely hopeful buying is unnecessary. In Buell experience, each job is sufficiently different from all others to warrant complete analysis and individual job engineering. Our specialized experience in this direction is yours for the asking . . . with no obligation whatsoever. If a cyclone collector is to be recommended, Buell has the patented van Tongeren 'Shave-Off' to do away with double eddy inefficiencies. If you are interested in principles, write for our catalog . . . if you have a specific problem, outline it for us. Remember . . . no obligation is involved. Write: Buell Engineering Company, 70 Pine Street, Suite 5040, New York 5, N. Y.

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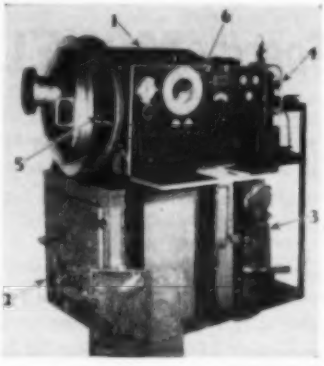
DUST RECOVERY

gypsum scale normally encountered can be prevented and there is no longer any need for frequent shutdowns for de-scaling. Other processes involving similar scale problems should yield to the same system.

The system makes use of a switching arrangement whereby the surfaces subjected to boiling liquid are periodically switched with the surfaces in contact with vapor and condensate. Thus, scale which forms is then dissolved or flushed off by the condensate before it has a chance to build up a firmly adherent coating. A single effect consists of two evaporator bodies and an external heating unit, with necessary pumps and piping. The heating unit is a separate body with flat-plate heating surfaces so arranged that the alternate channels are connected together. Since the channel arrangements are provided with reversing valves, either set of channels may be supplied with steam, while the other is passing the liquid. The two evaporator bodies are divided in the lower portion with a partition, so that one half will be handling liquid while the other half is bathed with vapor. Either natural or forced circulation can be used, and the evaporators can be arranged in either single or multiple effect.

General American Transportation Corp., Process Equipment Div., 10 East 49th St., New York 17, N. Y.



NEW HEAT SOURCE:

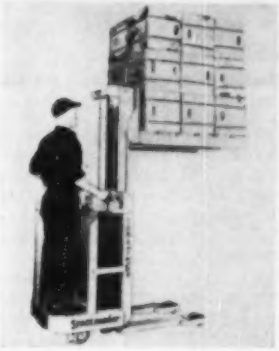
Freeze Dryer (146a)

What is called selective absorption heating is being used in a new unit for drying heat-sensitive materials from the frozen condition. This unit, manufactured and distributed by Proctor & Schwartz, was developed and patented by the Dry-Freeze Corp. of Chicago. The unit is intended particularly for the drying of pharma-

ceuticals, biologicals and medical and surgical supplies, blood, and chemicals, where heat sensitivity is an important factor. Material is dried while frozen, using certain selected wave lengths of infra-red radiation in the "fundamental vibration region" where radiant energy is absorbed selectively by different materials, depending on chemical composition.

It is said to be possible to select radiation in the region where the greatest percentage of the total energy will be absorbed by the water in the product to be dried. The unit, shown above, consists of a vacuum chamber (1), a freezer cabinet (2), a vacuum pump (3), a refrigeration system (4), a heater frame (5), and a control panel (6).

Proctor & Schwartz, Inc., Seventh St. and Tabor Rd., Philadelphia 20, Pa.



LIGHT, COMPACT:

Tiering Truck (147a)

Known as the SpaceMaker, a new small power-operated lift truck produced by Lyon-Raymond can tier 48 x 48 in. pallets in a 6 ft. aisle. Being light, the new machine can also be used on floors of insufficient carrying capacity for conventional heavier power trucks. The unit comes in three types, a platform type for skids, a fork type for single-faced pallets, and a straddle type for two-faced pallets.

Lyon-Raymond Corp., 5666 Madison St., Greene, N. Y.

CORROSION PROOF:

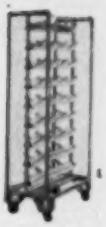
Graphite Globe Valve (147b)

Produced in sizes of 1 and 2 in., and proof against practically all chemicals, a new Karbate impervious graphite globe valve is being offered by National Carbon. Except for the Teflon packing, all valve parts in contact with the fluid are Karbate. The

(Continued)

SHEET METAL
FABRICATION
by Kirk & Blum

THE fabrication of well-known alloys as well as sheet steel and steel plate (up to ¼") has been a specialty of Kirk & Blum for more than 42 years. Your specifications are strictly adhered to and you get your products the way you want them . . . when you want them. KIRK & BLUM'S wealth of experience in this field is at your service. Send us your prints for estimate. No obligation.



PARTIAL LIST OF SHEET STEEL & STEEL PLATE PRODUCTS REGULARLY MANUFACTURED FOR PROCESS INDUSTRIES

Hoppers
Bins
Racks
Boxes
Shop Trucks
Pallets
Platforms
Cyclone Dust Collectors
Piping
Air Ducts
Hoods
Ovens
Dryers
Tanks—Steel
Tanks—Non-Corrosive
Tanks—Rubber or Lead Lined
Pans
Stacks
Broachings
Guards
Fume Exhaust Systems
Dust Control Systems
Air Handling Systems
Pneumatic Conveying (for Bulk Materials)
Bag Loading Systems
Louvre Plates
Eliminator Housings
Eliminator Plates

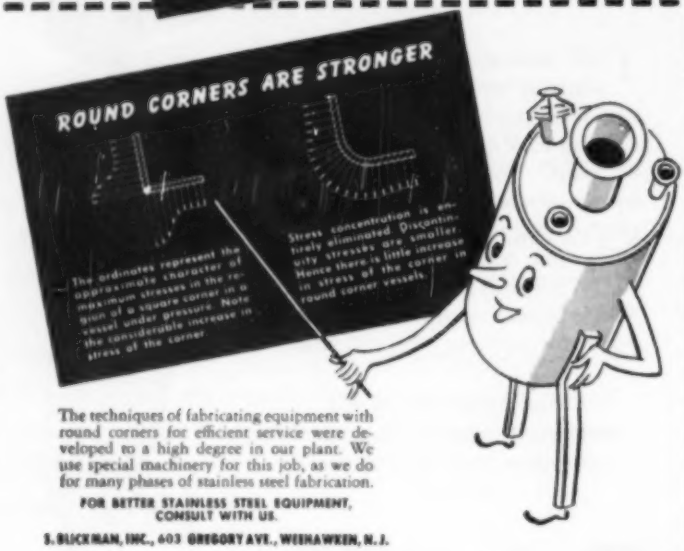
KIRK AND BLUM

The Kirk & Blum Mfg. Company
2907 Spring Grove Ave. Cincinnati 25, Ohio

WHY THEY BUILT ME WITH ROUND CORNERS

Advantages For Your Stainless Steel Equipment Revealed

ROUND CORNERS ARE EASIER TO CLEAN
Even the best brushes require extra time to clean accumulations gathered in square corners. With gummy material or material that hardens, complete removal may never be possible.
In Blickman round corner construction the brush has no difficulty in cleaning the entire surface of the round corner. This saves time and reduces the danger of contamination and corrosion.


ROUND CORNERS ARE STRONGER
The ordinates represent the approximate character of maximum stresses in the region of a square corner in a vessel under pressure. Note the considerable increase in stress of the corner.
Stress concentration is entirely eliminated. Discontinuity stresses are smaller. Hence there is little increase in stress of the corner in round corner vessels.

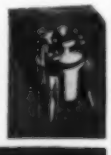
The techniques of fabricating equipment with round corners for efficient service were developed to a high degree in our plant. We use special machinery for this job, as we do for many phases of stainless steel fabrication.

FOR BETTER STAINLESS STEEL EQUIPMENT, CONSULT WITH US.

S. BLICKMAN, INC., 603 GREGORY AVE., WEEHAWKEN, N. J.

S. BLICKMAN, INC.
Guards Alloys in Fabrication

SEND FOR THIS VALUABLE BOOK
A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."



CORROSION RESISTANT PROCESSING EQUIPMENT

TANKS • KETTLES • STILLS • HEAT EXCHANGERS • AGITATORS • MIXERS • TOWERS • PIPING

valve is small and light, is credited with excellent thermal conductivity and thermal shock resistance, It is self-lubricating.

National Carbon Division, Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, N. Y.

AUTOMATIC OPERATION:

Bulk Weigher (148a)

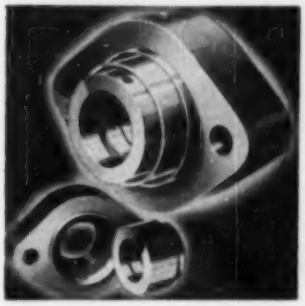
Known as Class E-50, a new fully automatic hopper scale is now being offered by Richardson. This scale is said to lend itself to the handling of nearly any dry, cool, granular, crushed or powdered material. It can be provided with any desired feeding arrangement, its construction is dust-tight, and it is operated automatically by electric controls. The weighing hopper, designed for the capacity required and the material to be handled, is suspended from one end of a low-ratio, one-piece scale beam. At the other end are counterweights and the indicator to show balance on test weighings.

After a weighing is completed, the beam actuates a limit switch causing the feed gate to close instantly. Discharge, controlled by a suitable mechanism, can occur immediately or be delayed to meet process requirements. Before discharge, the accuracy of weighing can be determined to within 1 oz. on the free scale beam. The E-50 can be used in various automatic weighing cycles, delivering at substantially constant rate (small batches), or delivering at timed intervals, or a specific number of weighings. Designed primarily for smaller quantities from 5 to 50 lb., it has a range from 5 to 200 lb. weight and up to 4 cu. ft. by volume.

Another new development of this company, a take-away belt for delivering from scales similar to the E-50, is produced in lengths from 16 to 60 in., in widths from 2 to 8 in., and is provided with a variable-speed drive for speeds from 0 to 200 ft. per

min. The variable-speed drive can be adjusted automatically to vary the stream in conformity with the timed discharges of the automatic scale above, and so maintain a continuous, accurately weighed stream.

Richardson Scale Co., Clifton, N. J.



FOR HYDROCARBONS

High Pressure Seal (149a)

To meet conditions of high temperature and high pressure in the handling of hydrocarbons, Felt Products Mfg. Co. has introduced a centrifugal pump seal suitable for pressures to 600 psi. and temperatures to 250 deg. F. Known as the Fel-Pro Type H-P seal, the device is said to incorporate improved control of balance of hydraulic pressures, to eliminate the problem of excessive sealing face wear; a reduction in the number of parts susceptible to wear so as to minimize maintenance; and a simplified cooling method which eliminates the need for auxiliary cooling systems. Among the various liquids for which these seals are said to be suitable are crude oils, gasoline, propane, and similar materials.

Felt Products Mfg. Co., Packing Division, 1508 Carroll Ave., Chicago 7, Ill.

FOR LOW SPEED USES:

Industrial Turbine (149b)

Using close-coupled integral reduction gears, a new industrial turbine developed by Westinghouse is said to be particularly suitable for driving fans, pumps, compressors and generators. The design enables these machines to be driven at their proper speeds, while the turbine also operates at its most efficient speed. Designated as Type E, the new turbine is said to be rugged and compact, with turbine and gearing factory-aligned on a single heavy steel base which also serves as an oil tank.

Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

(Continued)

VAPORIZING LIQUID
The all-purpose extinguishers effective on almost every kind of fire. Safe on electrical fires, too! Hand or pressure operation.
CHEMICAL FOAM
2½ gal. size produces about 22 gals. of fast-acting foam. Ideal for flammable liquid hazards. Also 10 gal. and 40 gal. (above) wheeled units, and systems.
CARTRIDGE-OPERATED
Eliminates annual recharging. For fires in wood, paper, textiles. Shoots water or anti-freeze solution. 2½ gal. size.
AIR FOAM
Couple Playpipe to hose line. Every 19 gals. of water and 1 gal. of PYRENE Foam Compound yield 350 gals. of foam! For ordinary combustibles and flammable liquids.
SODA-ACID
Standard protection for ordinary combustibles. Shoots a steady 40 ft. stream. 2½ gal. size. For offices, factories, stores. Also 40 gal. wheeled units.
MANUAL AND AUTOMATIC SYSTEMS
and other
extinguishers

Pyrene has what it takes

Name any kind of fire hazard—there's a PYRENE to guard it

Every PYRENE* product is precision-made for *sure* protection. When you want new PYRENE extinguishers, you can get them quickly . . . distributors in all leading cities carry them in stock. There are 180 PYRENE service depots throughout the country ready to give you immediate repair service on PYRENE pump-type extinguishers or furnish parts for other types. Depend on PYRENE for all your extinguisher needs. Write for addresses of your local distributor and service depot.

*T. M. Reg. U. S. Pat. Off.

Pyrene

PYRENE MANUFACTURING COMPANY

593 Belmont Avenue — **Newark 8, New Jersey**

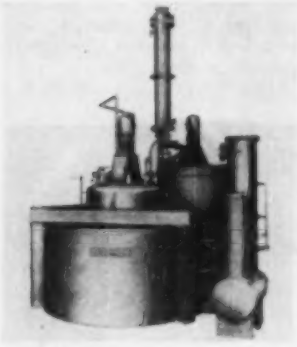
Affiliated with C-O-Two Fire Equipment Co.

Here's Equipment Built to Stand Up
Under Your Production Requirements
for **METERED PRESSURE PUMPING**
of Such Chemicals as:

SULPHURIC ACID
NITRIC ACID • LIQUID CHLORINE
HYDROCHLORIC ACID • SLURRIES
CHLORINATED HYDROCARBONS
HYDROGEN PEROXIDE • PROPANE
HYDROFLUORIC ACIDS • OLEUM
CYANIDE COMPOUNDS • STYRENE
SODIUM HYDROXIDE • FREON

- NO STUFFING BOX OR RUNNING SEAL
- HYDRAULICALLY-BALANCED DIAPHRAGM SEAL
- POSITIVE DISPLACEMENT PISTON MEASUREMENT
- FLOW RATE ADJUSTABLE WHILE IN OPERATION
- OIL-BATH LUBRICATION OF ALL MOVING PARTS
- UNITS AVAILABLE FOR MANUAL OR AUTOMATIC CONTROL

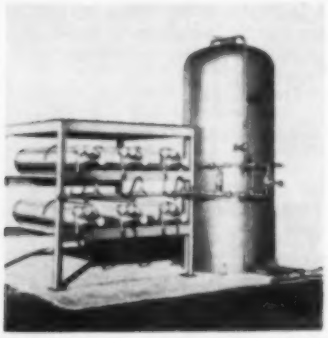
Lapp PULSAFEEDER
PISTON-DIAPHRAGM CHEMICAL PROPORTIONING PUMP
WRITE for Bulletin 262 with complete description and specifications.
LAPP INSULATOR CO., INC., PROCESS EQUIPMENT DIVISION, 202 MAPLE STREET, LE ROY, N. Y.



PRE-ASSEMBLED:
Resin Unit **(150a)**

For such operations as oil-bodying, manufacturing synthetic resins of all types, and many polymerizations and other processing reactions, Patterson Foundry has developed a package-type, direct-fired synthesizing unit which is pre-assembled and shipped in sections for ready assembly in the field. The unit consists of a 1,000-gal. agitated kettle equipped with automatic and recording oil burners, a 2,000-gal. capacity jacketed and agitated cooling and thinning tank, a reflux condenser, the necessary piping, and other auxiliaries. The condenser is used interchangeably on either the kettle or the thinning tank.

The Patterson Foundry & Machine Co., East Liverpool, Ohio.



BIGGER EXTINGUISHERS (150b)

Formerly used in portable service, dry chemical extinguishers are now going into the stationary field. This large Ansul unit is being built in sizes from 500 to 2,000 lb. capacity. The unit consists of a centrally located supply tank, plus nitrogen cylinders. Permanent piping runs to one or more hose houses where 1-in. chemical engine hose is coiled.—Ansul Chemical Co., Marinette, Wis.

CAN'T WET THIS MOTOR (151a)

Elliott's new outdoor splash-proof motors, built in sizes from 150 to 2,000 hp., have a ventilating system with straight-through inlet and discharge openings at both ends, insuring full protection from all directions against wind-driven rain. The internal baffles prevent water or other foreign material from entering the interior of the motor itself. In the test shown, a huge volume of high-pressure water failed to interfere with satisfactory motor operation. —The Elliott Co., Ridgway Div., Ridgway, Pa.

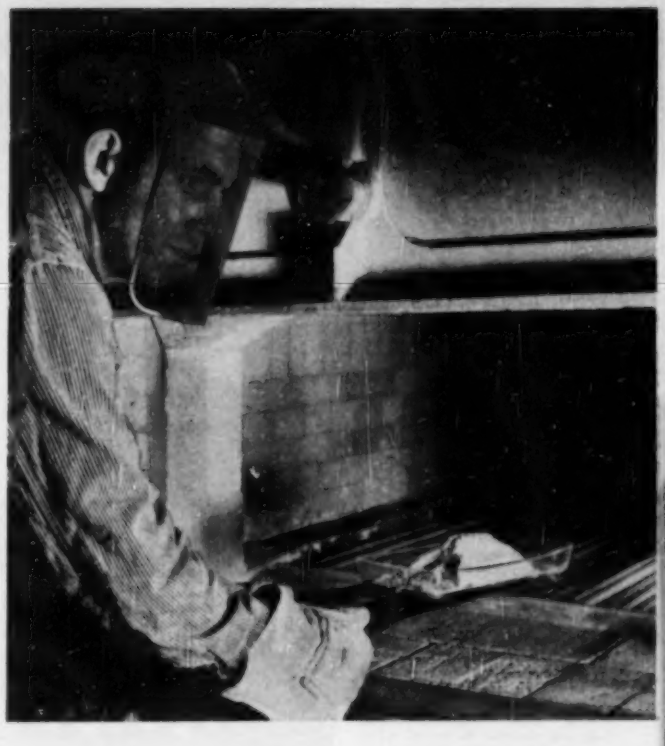
DUAL DISCHARGE:

Improved Grinder (151b)

Lower grinding costs are encountered in many grinding operations, it is claimed, through the use of a new dual-discharge feature now found in the standard line of disintegrators produced by Rietz Mfg. Co. The dual discharge is said to enable waste or resistant materials to be separated and discharged separately from the main product, thus preventing clogging and loss of power through excessive recycling. This feature is readily incorporated, owing to the vertical design of the disintegrator. Five models of this company's grinding machines are now equipped with dual discharge.

Rietz Mfg. Co., San Francisco 5, Calif.

(Continued)



The hotter the problem . . . the more Vycor Brand glassware saves

Of all the glasses produced by Corning, VYCOR brand glasses are tops for high temperature work. It's to your advantage to use them wherever practical because they will save you money.

For example, VYCOR trays are used in calcining certain chemicals, a very severe service. In one particular instance, with temperatures approaching 1200°C, VYCOR trays outlasted another silicious material 4 to 1! Contamination has been eliminated completely.

In addition, it is remarkably inert to acids, mild alkalies, water and steam at a wide range of temperatures. Particularly hard, it resists pitting and scratching. It's like fused silica in properties and performance.

Engineered to your needs, VYCOR brand glasses can be fabricated into plant equipment through the use of cylinders, tubing, rods or plates. Send for Bulletin EB-1 which shows you how VYCOR brand glasses are being used to cut costs.

CORNING GLASS WORKS PYREX **CORNING, N. Y.**

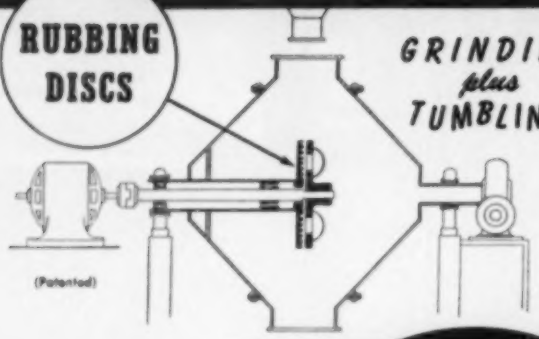
Corning means research in Glass

Technical Products Division: Glass Pipe, Laboratory Glassware, Plant Equipment, Lightingware, Signalware, Gauge Glasses, Optical Glass, Glass Components

G·R·I·N·D·S as it Mixes!

RUBBING DISCS

GRINDING plus TUMBLING



(Patented)

When "drastic action" is needed the MUENCH Mixer delivers the goods. Materials of any strength can be extended to varying standards through extenders of various types to a complete blend where every particle, regardless of character, is evenly rubbed together and mixed many times.

While basically the GEMCO Blender, this MUENCH Mixer embodies Patented interior rubbing discs, which grind and abrade the material constantly while it is being tumbled . . . blends more effectively and increases the degree of perfection. More is accomplished with less handling; its versatility allows various products to be ground, mixed and weighed with but a single handling. No other blender can duplicate the results of the MUENCH Mixer . . . Arrange for a FREE TEST RUN of your materials . . . and we'll prove it!

The MUENCH Mixer

for the highest degree of perfection in dry blending

Advantages:

UNIFORM *particle dispersion and thorough blending of dry materials, powder or granule, before or after pulverizing, in one operation.*

RAPID, *smooth, vibration-free operation. (Totally enclosed worm gear drive.)*

ECONOMICAL, *very low power consumption, minimum maintenance.*

CLEAN . . . *Conical shaped blender permits 100% emptying, without dust, and with minimum chances of contamination. Easy to clean. No baffles.*

ONE-MAN OPERATION . . . *Push-button simplicity.*

SAFE . . . *Minimum "occupational hazards for workers."*

SELF-CONTAINED, *precision built, assembled and inspected carefully in our plant. (Motor is built into unit.)*

CAPACITY . . . *Blends batches up to 25,000 pounds.*

IT EMPLOYS *that GEMCO Spherical dust-tite valve, that makes for easy loading and discharging. "Works like a charm."*

"Solved our most difficult problem . . ."

We quote from Mr. Jack Strong, Plant Manager, the Eagle-Picher Company, Newark, N. J., "The Conical MUENCH Mixer solved our most difficult problem in mixing heavy material with light material when all previous methods had failed."

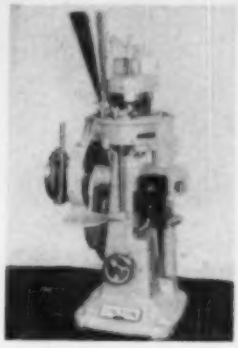
Write us . . . we can help you!

General Machine Company of New Jersey

Established 1916

SPECIAL CHEMICAL AND MIXING MACHINERY • SPHERICAL VALVES

400 MARKET STREET • NEWARK 5, N. J.

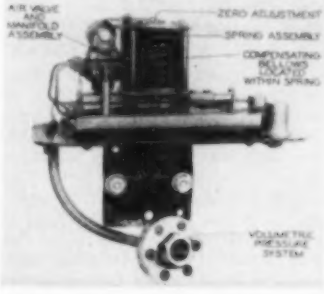


ACCURATE, ACCESSIBLE:

Rotary Tablet Press (150a)

Newest Colton development in the pharmaceutical field is the No. 216 rotary tablet press which has a capacity of 650 tablets per minute of ⅝ in. maximum diameter. The press employs 16 punches and dies, giving a maximum pressure of 6,000 lb. A micrometer cell adjustment is said to hold tablet weight accurately and consistently. The unit is equipped with a variable-speed drive and an automatic adjustable excess pressure release to protect against accidental damage. The use of heat-treated spiral bevel gears and a helical pinion is said materially to reduce power requirements, permitting use of a standard 1-hp., 1,800-rpm. motor. All working parts are readily accessible and precautions are provided to prevent tablet material from sifting down into the drive mechanism.

Arthur Colton Co., Division of Snyder Tool & Engineering Co., 3400 East Lafayette Ave., Detroit 7, Mich.

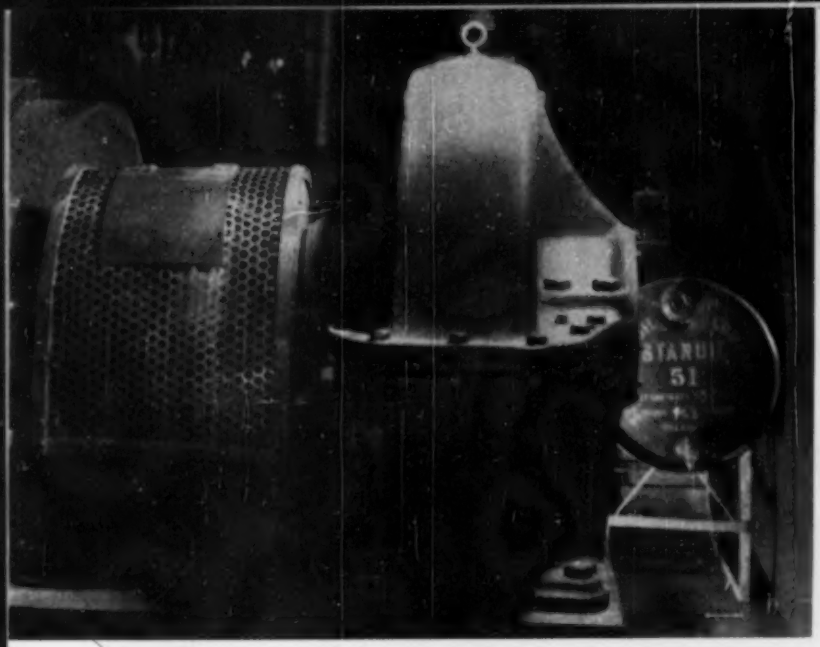


FORCE-BALANCE SYSTEM:

Pressure Transmitter (150b)

As a companion to its Transaire temperature transmitter, Taylor Instrument Cos. have now brought out a Transaire pressure transmitter oper-

(Continued)



Arrest the dirty work in reduction gears

THE dirty work starts in reduction gears when the lubricating oil begins to oxidize and break down under the attack of heat and air. Oxidation products, uniting with dust and other foreign matter, form deposits which interfere with proper lubrication and cause gear wear.

You can head off this dirty work—avoid costly cleaning jobs, oil changes, and gear wear—by using STANOIL Industrial Oil. The high stability of STANOIL prevents deterioration by heat. Its low-carbon-forming base oil keeps gears free from carbon. An inhibitor curbs acidity growth which would cause the formation of emulsions and sludge.

The many qualities of this one oil enable it to handle a wide variety of jobs in your plant. To assure you maximum benefits from STANOIL and other high-quality petroleum products, the Standard Oil Company has a well-trained and experienced lubrication specialist located practically at your doorstep. How you can profit by this unique product-service combination is explained at the right.

Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

STANOIL
TRADE MARK
Industrial Oil

What's YOUR problem?

• To help you solve particular lubrication problems or gain greater all-around economy, Standard Oil has set up an industrial service that's unrivalled in the Midwest. This service puts at your immediate disposal the help of a highly trained, experienced lubrication specialist and a reliable supply of petroleum products. All you need do is phone or address a card to the nearest Standard Oil Company (Indiana) office. In fact, why not start right now by arranging for the visit of the lubrication specialist assigned to your plant. With his help, find how many different oils in your plant can be replaced by STANOIL Industrial Oil on such applications as:

Hydraulic systems...cleaner operation, no foaming troubles.

Air compressors... no sticking or clogging of valves, less oil consumption in splash or circulating systems.

Speed reducers... less wear of gears and bearings during frequent cold starts or prolonged high-temperature operation.

Steam turbines... freedom from emulsions and sludge, fewer oil changes necessary.

Ring-oiled bearings... rings function immediately on starting, less bearing wear.

Circulating and bath systems...one oil for a wide variety of jobs.

STANDARD **STANDARD OIL COMPANY (INDIANA)**

Performance proved..

I•P•E AGITATORS

again specified by

CITIES SERVICE

A typical I•P•E Curved-and-Pitched Blade Turbine.

Cities Service Oil Company has specified I•P•E Side-Entering and Turbine Agitators for its new Chicago Terminal because of top performance records established by 29 I•P•E units at the company's Lake Charles, La., refinery.

Such confidence-inspiring repeat business is the common occurrence at I•P•E. After learning first hand what I•P•E agitating equipment offers in efficient, dependable, low-cost performance, processors have excellent reason to consult I•P•E for future requirements.

CHECK THESE IMPORTANT REASONS

why I•P•E warrants your consideration

1. I•P•E's staff of experienced engineers is at your service, at no charge, to help you plan the best equipment for your job.
2. I•P•E units are designed and built to give trouble-free service.
3. I•P•E processing equipment is lower-priced, too.
4. I•P•E's delivery schedules are prompt.

Whatever your process involves . . . liquids, emulsions, dispersions, slurries, pastes, greases, soaps, solids, or dry powders . . . there is an I•P•E unit that solves every mixing or blending problem. What's more, I•P•E will design and construct the vessel, too, presenting a complete process unit of optimum efficiency and economy.

Request our descriptive catalog NOW. And send us your specifications for quotation . . . or, better yet, call for one of our qualified engineers . . . he'll point out why I•P•E processing equipment is the best buy for you.

IPE ENGINEERS DESIGNERS MANUFACTURERS ★ INDUSTRIAL PROCESS ENGINEERS

2 Lister Avenue, Newark 5, N. J. Branch Offices in Principal Cities

ating on the force-balance system. This transmitter makes it possible to measure and transmit up to 1,000 ft. the smallest of pressure changes with an accuracy of 0.5 percent of the range span. Range spans of 20 to 40 psi. are available over range limits of 35 to 415 psia. The instrument employs a stainless steel, solid-filled volumetric pressure system to protect the diaphragm in the capsular chamber from process materials. Regardless of the pressure range or span, the transmitter output is always linear, from 3 to 15 psig. Operating ranges can be varied by a simple screwdriver adjustment, while range limits can be shifted, if necessary, by changing the spring sub-assembly.

This concern has also announced a new 1,200-deg. F. mercury thermal system for higher temperature applications than can be handled with the conventional 1,000-deg. F. instrument.

Taylor Instrument Cos., 95 Ames St., Rochester 1, N. Y.

BRIEFS . . .

V. S. HYDRAULIC AGITATOR. Emerson-Scheuring is now offering a variable speed hydraulic agitator in sizes from 1 to 50 hp., for infinitely variable operating speeds from 15 rpm. up. The unit consists of an electrically operated hydraulic pump, coupled by piping of any desired length to a fluid motor direct-connected to the agitator. For limited headroom applications, the motor requires not more than about 24 in. Several agitators may be driven from one electrical power unit.

Emerson-Scheuring Tank & Mfg. Co., 21st and Martindale Ave., Indianapolis 7, Ind. **(154a)**

LUBRICATOR CAP. To prevent possible lubricant contamination in dusty and dirty locations, the new Elastoplastic cap has been designed to fit over ¼ in. Alemite Dot lubricant fittings. These caps, made of black flexible Vinylite, are easily applied and removed and are unaffected by lubricants.

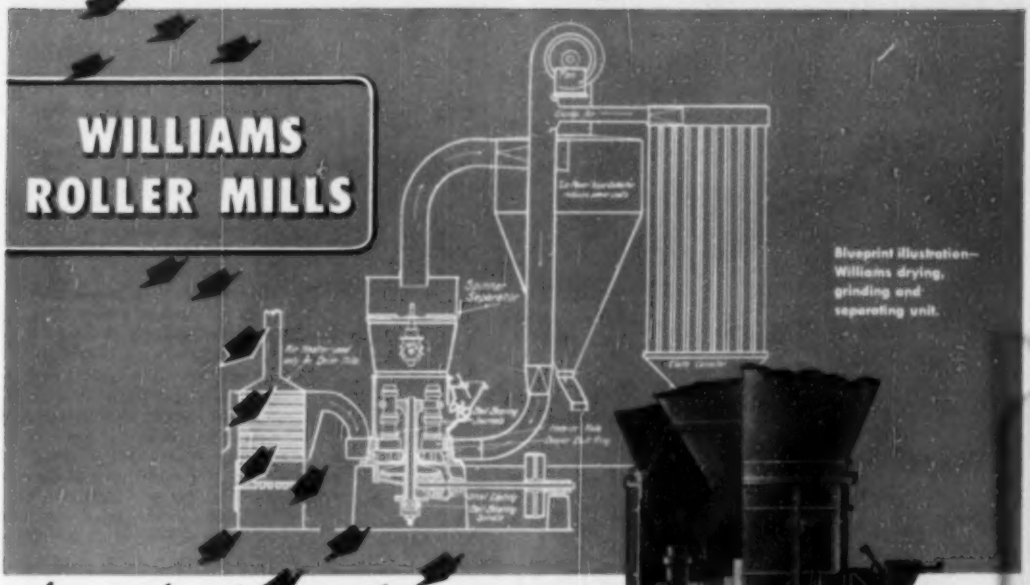
S. S. White Dental Mfg. Co., Plastics Division, 10 East 40th St., New York 16, N. Y. **(154b)**

ALUMINUM GAS LINE. Said to be the first aluminum line installed for gas is an all-welded line 18 mi. long, running from the main trunk line of the Alabama-Tennessee Natural Gas Co., to the Listerhill, Ala., plant of Reynolds Metal Co. This

(Continued)

For those Fine Grinding Jobs . . .

WILLIAMS ROLLER MILLS



Blueprint illustration—Williams drying, grinding and separating unit.

let's look at the record

PYRETHRUM AND OTHER FIBROUS INSECTICIDES

The Williams Roller Mill has given excellent results in the grinding of various rotenone bearing insecticides as it pulverizes the fibres to the same uniform fineness as the rest of the plant. Pyrethrum flowers can be pulverized to 98.5% passing 200 mesh. Also grinds D.D.T., Sodium Fluoride, etc.

PAINTS, PIGMENTS, DRY COLORS

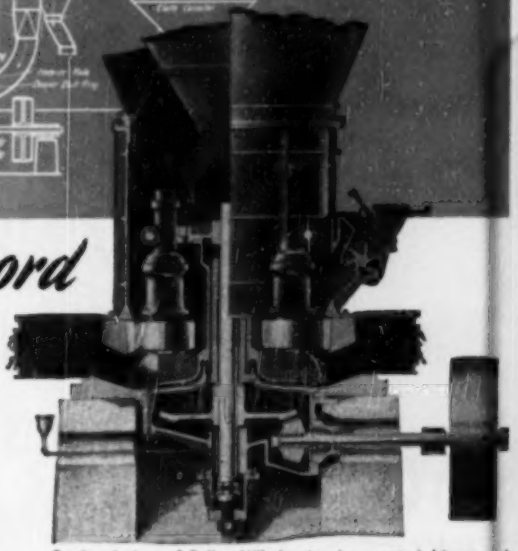
Williams Roller Mills are establishing remarkable records in the grinding of pigments and dry colors to finenesses of 99.95% 325 mesh and finer. Fineness instantly changed by varying speed of Spinner Separator Blades.

FINE GRANULATIONS

Williams has developed a special type of impact pulverizer to operate in connection with the air separator for the making of fine granulations of 30 to 80 mesh with a minimum of fines.

BARYTES, PHOSPHATE, LIMESTONE

Almost any mineral can be economically pulverized with the Williams Roller Mill. Finenesses quickly changeable from 40 mesh to 400 mesh. All can be dried and ground simultaneously by introduction of hot air.



Sectional view of Roller Mill showing how material is ground between rolls and bull ring, then air swept to Separator which extracts fines and returns oversize for re-grinding.

WILLIAMS ALSO MAKES . . .

Heavy-duty hammermills; impact and roller mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "packaged" crushing and grinding plants.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
2706 N. NINTH STREET ☆ ST. LOUIS 6, MO.

WC49-11

WILLIAMS

CRUSHERS GRINDERS SHREDDERS

Saran rubber, developed by The Dow Chemical Company, leads the way to cutting corrosion costs to a minimum. The extremely high degree of chemical and abrasive resistance, found in saran rubber, makes it the outstanding tank lining where the storage and conveyance of grease, solvents, acids or other chemicals is indicated.

Saran rubber can be applied easily and economically by experienced tank lining applicators located strategically throughout the country. Saran rubber lined pipe is available also—8 inch diameters and larger, and up to 20 feet in length.

Get in touch with an applicator today by contacting your nearest Saran Lined Pipe Company office—find out how you can add many years to the life of your costly equipment. Write: Dept. TSP-77.

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Saran Lined Pipe Company

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Offices in: New York • Boston • Philadelphia • Pittsburgh
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SARAN RUBBER
a
DOW
product

⅜ in. O.D. extruded aluminum alloy pipe will be welded with the Heliarc method and hence will require no flux. The pipe is being protected by applying cold No-Oxide pipe wrap, except for a single 40 ft. section which will be bypassed with a wrapped length. The unwrapped section will be dug up at six-month intervals for examination, since experimental work already completed has suggested wrapping of aluminum pipe may not be necessary.

Reynolds Metal Co., 2500 South Third St., Louisville, Ky. **(154c)**

BYPASS PUMP. Eco is now able to provide a gearless pump with a built-in hydraulically balanced bypass. This involves a simple design with only four small parts and is said to offer important advantages over conventional bypasses which merely return to the suction side of the pump an amount of water in excess of the set pressure of the bypass. With the new bypass, a constant volume is delivered at constant pressure, regardless of supply pressure variations.

Eco Engineering Co., 12 New York Ave., Newark, N. J. **(156a)**

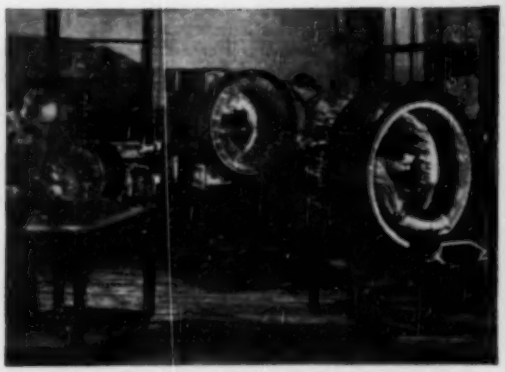
HYDROGEN SULPHIDE MASK. Protection against both hydrogen sulphide and petroleum vapors is afforded by a new mask offered by Willson Products. The mask consists of a face piece, corrugated breathing tube, canister and back harness. Absorbent chemicals said to give extra long service life are used. Since the mask is not air-supplied, it should not be used inside storage tanks or in any confined space where oxygen content may fall below 16 percent. It is said to be particularly useful for tank gagers, pump-house men, and others subjected to hydrogen sulphide from sour crudes and raw distillates.

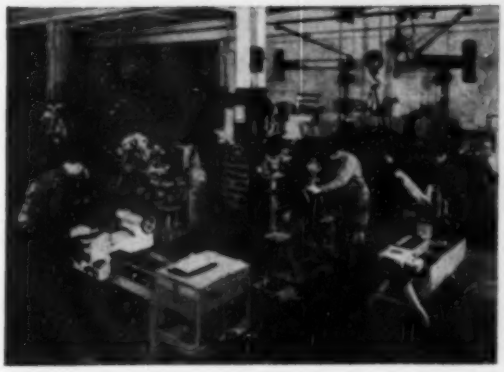
Willson Products, Inc., Reading, Pa. **(156b)**

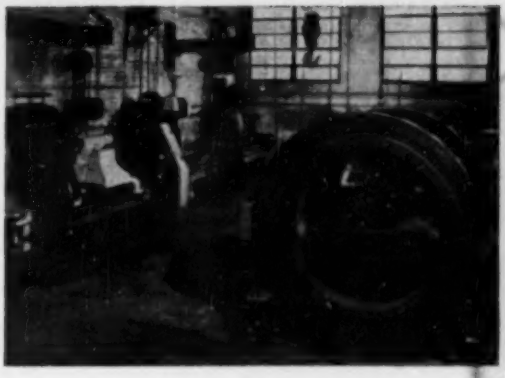
NEW STAINLESS. Carpenter No. 10 is a new chrome-nickel austenitic stainless steel which work-hardens much slower than conventional 18-8 types and therefore can be drastically cold worked to form fastenings such as cold-headed and cold-upset and punched nuts. This makes it possible to secure commercially produced fastenings which provide the full corrosion resistance of 18-8 stainless. It will therefore no longer be necessary to specify less corrosion resistant fastenings for use in 18-8 assemblies.

The Carpenter Steel Co., Reading, Pa. **(156c)**

—*End*







For Any Size Motors

DEPEND ON REPAIR SERVICE LIKE THIS!

Example: a Midwest Utility recently burned out a vital 75 hp motor. They called Chicago Electric, their nearby A-C Certified Service Shop, at 11:00 a.m. At 4:00 p.m. the *same day*, Chicago Electric had the unit repaired and back in service! Total time: 5 hours.

WHEREVER YOU ARE, you can get quick, dependable service from your nearby A-C Certified Service Shop, for there are over 75 such shops in all major industrial areas.

These shops have been selected on the basis of, **1)** quality of their work, **2)** facilities, and **3)** their community reputation. They maintain experienced personnel and use factory parts or parts of equal quality. They can be relied on for good work at honest prices.

When you need this kind of repair service on motors, controls or transformers, call your nearest Allis-Chalmers Certified Service Shop.

Need New Motors Or Starters?

For motors from one hp up to the largest sizes — with Allis-Chalmers controls to match — call your nearby A-C Dealer or Sales Office.

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CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

New Products and Materials

JOSEPH A. O'CONNOR, News Editor

REACTIVE:

Chloroacetaldehyde (158a)

Newest addition to Dow Chemical Co.'s group of special chemicals is chloroacetaldehyde, now obtainable. Many chloroacetals have been made from chloroacetaldehyde, among them the dimethyl, diethyl, such cyclics as 2-chloromethyl-1, 3-dioxolane, and others. A strong aldehyde, the new chemical undergoes all typical aldehyde reactions.

It is supplied as a 40-45 percent water solution, for in concentrations above 50 percent in aqueous solution, it forms a half hydrate that is insoluble and precipitates from solution.

Besides the highly active aldehyde group, it possesses a replaceable chlorine atom. Because of its strong characteristics, the aldehyde group must be blocked before the chlorine can be replaced. Chlorine replacement permits the preparation of such compounds as 2,4-dichlorophenoxyacetaldehyde, amino and substituted amino acetals. The amino acetals are important in the production of certain antihistaminics.

Dow Chemical Co., Midland, Mich.

FROM PINE GUM:

Maleo-Pimaric Acid (158b)

Maleo-pimaric acid, a new naval stores product developed by the Department of Agriculture, has possibilities for use in the preparation of plasticizers, resins and emulsifying agents. The development has reached a stage where samples are going out for commercial testing.

Recent work on maleo-pimaric acid has been financed by funds provided under the Research & Marketing Act of 1946, and has been carried out at the Naval Stores Station in Olustee, Fla. The pilot-plant investigations have been based on earlier laboratory research and on a process for refining oleoresin, covered by U. S. patent No. 2,359,980, which was granted to a member of the Naval Stores Research Division and assigned to the Secretary of Agriculture for licensing to firms and individuals on a royalty-free, non-exclusive basis.

Maleo-pimaric acid is the adduct—addition product—of maleic anhydride with the levopimaric acid of pine gum. It is a white, crystalline, tribasic product with an acid number in acetone solution of 420 and a molecular weight of 400. The pure product (produced in small quantities in the laboratory) melts at 229 to 230 deg. C., while maleo-pimaric acid produced in the pilot plant has a slightly lower melting point (222 to 225 deg. C.). Maleo-pimaric acid is soluble in acetone, ether, alcohol and aromatic solvents, and is practically insoluble in aliphatic hydrocarbons.

Properties of the maleo-pimaric acid are such that it should find successful application in alkyd resins and in sizing agents.

Low volatility of its alkyl esters and their compatibility with many resins indicate promise as a plasticizing agent.

The soap of the ethyl maleo-pimaric acid has been evaluated on a pilot-plant scale as an emulsifier in the preparation of a synthetic rubber. The rubber produced compares favorably in quality with standard GR-S.

Samples of this product can be obtained by concerns or individuals interested in exploring possible commercial applications.

Naval Stores Research Division, Southern Regional Research Laboratory, Bureau of Agricultural & Industrial Chemistry, 2100 Robert E. Lee Blvd., New Orleans 19, La.

FOR ORGANISOLS:

Synthetic Wax (158c)

A new method of incorporating high-melting waxes into various fluid compositions has been developed by the Glyco Products Co., Inc.

About 1 percent Acrawax C Powdered (based on solids) is dissolved in the hot plasticizer and solvent. The plasticizer and solvent are, of course, those that are already being used in the product or will be tolerated by the product. This hot solution of Acrawax C is then poured slowly into a large batch of cold organisol while it is being vigorously stirred. The Acrawax C appears to gel out im-

NOT MILK, BUT GALLIUM METAL (158d)

Like water, but unlike most elements, gallium expands on solidifying. Here liquid gallium has frozen, shattering the unstoppered bottle and forming a "top" similar to the one that appears on a frozen bottle of milk. Although pure gallium melts at 86 deg. F., it is impossible to predict its exact solidification temperature. Gallium has a strong tendency to undercool, and the liquid metal may be held for some time at temperatures almost as low as the freezing point of water without solidification taking place. Despite its 86 deg. F. melting point, gallium does not boil until it is heated to about 3,600 deg. F. Hence it is finding an application in high-temperature thermometers. From every ton of bauxite it processes at its East St. Louis, Ill., plant, Alcoa gets 1 oz. of gallium. An ounce sells for $140. Aluminum Co. of America, 2156 Gulf Building, Pittsburgh 19, Pa.

mediately on coming in contact with the cold organisol and forms an extremely fine dispersion.

Incorporation of Acrawac C in lacquers and coatings of various kinds prevents blocking or sticking due to heat, pressure or aging. This method of incorporation prevents graininess or spotting.

Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y.

IN HOLLOW CYLINDERS:

Maleic Anhydride (159a)

Now in quantity production from facilities just completed by the Carbide & Carbon Chemicals Division of the Union Carbide & Carbon Corp. is a newly developed physical form of maleic anhydride. The anhydride is being produced as small hollow cylinders approximately 1¼ in. in length, 1¼ in. outside diameter, and ¼ in. inside diameter.

This new form of maleic anhydride has the advantage of maximum surface area to permit rapid melting or dissolving. In addition, it is resistant to dusting and is easy to handle in normal plant operations.

The material has a minimum purity of 99.0 percent maleic anhydride and melts at 52.2 deg. C. It is priced at 30c. a lb. in carload quantities delivered in the East. The hollow cylinder form is shipped in fiber drums holding 275 lb. net. Carbide can also supply maleic anhydride in fused form where desired.

Carbide & Carbon Chemicals Division, Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, N. Y.

LOW COST:

Plasticizer (159b)

A new plasticizer of the polyester type is announced by the Chemicals Division of the General Electric Co. Designated as GE 2559, the new material is similar to GE 2557 plasticizer but lower in cost.

The new plasticizer is reported to have good heat, light and weather resistance, improved oil and water resistance, as well as improved nonmigrating characteristics.

Compared to GE 2557, the GE 2559 plasticizer is higher in viscosity, not as light in color, and is less efficient, GE says. It is suitable, however, for plasticizing polyvinyl chloride, ethyl and nitrocellulose lacquers, and chlorinated, natural and synthetic rubbers.

General Electric Co., Chemicals Division, Pittsfield, Mass.

FLOWS LIKE WATER

Starch Derivative (159c)

Latest derivative of corn starch introduced by National Starch Products, Inc., is Dry-Flow, a finely divided powder of such silk-like texture that it flows almost like water. However, it is hydrophobic and therefore is not wetted by water; it cannot be gelatinized by heating in water; and it floats on the surface of water without clumping. These properties are demonstrated when Dry-Flo is run with the freedom of a liquid through a funnel onto the surface of a liquid in a beaker (see cut).

Although the presence of the hydrophobic groups makes Dry-Flow extremely difficult to wet with water under ordinary conditions, it can be wet with water if a wetting agent is used or if the dry material is first wetted with alcohol or some other water-miscible solvent. When Dry-Flo is first wetted with a little alcohol or other water-soluble solvent and then wetted by water, it can be cooked in the usual manner at 185-200 deg. F. for 20 min. Slight foaming will occur as the alcohol boils off. Dried films of the cooked Dry-Flo show moderate water-repellent properties.

Physical characteristics of Dry-Flo include: a pH of 6.5 to 7.0 in suspension in distilled water; an ash content varying from 0.4 to 1.0 percent; a moisture content at 50 percent relative humidity of approximately 10-11 percent; gelatinization temperature (8 percent by weight) of 70 deg. C.; practically no solubility of non-wetted material in water; and practically no solubility of wetted Dry-Flo in solvents.

Although the moisture content of Dry-Flo will vary slightly according to the relative humidity of the surrounding atmosphere, Dry-Flo does not wet when added to water, but remains dry and floats on the surface.

Maximum viscosity of a hot 8 percent (anhydrous basis) paste of Dry-Flo is approximately 1,500 centipoises.

When cooked 8 percent Dry-Flo solutions were mixed with 10 percent by weight (based on the starch solution) of various chemicals, the results were: aluminum sulphate, tannic acid and hydrochloric acid caused immediate thinning and ultimate precipitation of the starch. Basic lead acetate precipitated the starch immediately, while ferric chloride, ferrous sulphate, stannous chloride and acetic acid caused slow precipitation (1 to 5 days). Potassium bichromate, silver nitrate, barium nitrate and citric acid apparently had no effect.

Dry-Flo is rapidly peptized by 4M solutions of zinc chloride, calcium chloride, ammonium thiocyanate, sodium nitrate and 90 percent formic

(Continued)

More Information . . .

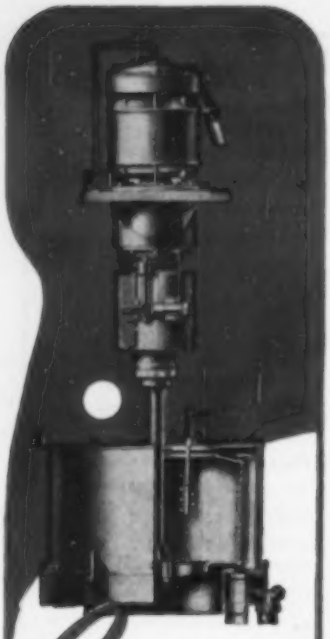
To find out more about any of these new products, check the item's number on the Reader Service Postcard inside the front cover.

This Month . . .

Other valuable new products are described on following pages . . . On p. 160 you'll learn about Terramycin, newest antibiotic weapon in man's fight against disease . . . For the graphic arts industry, a new letterpress acetate ink has been developed; it permits plate polishing of printed acetate sheets. See p. 162 . . . An inhibitor, described on p. 164, licks sulphide corrosion in producing oil wells.

Next Month . . .

Watch for these: a reinforcing resin for sole rubber; and a new antioxidant, an alkylated aromatic amine that is oil-soluble.



Centrifugals

If your process requires the efficient application of centrifugal force, consider this: in the Roberts Fluid Drive Centrifugal, and only in the Roberts machine are the following features to be had.

STANDARD MOTOR
with current peak less than 40% of direct connected (special) motor drives.

UNIFORM TORQUE
with adjustable application

ACCURATE SPEED CONTROL
simply adjusted

And further, the inherent design of the Roberts Fluid Drive Centrifugal allows special characteristics to be incorporated with ease; thus suiting it exactly to your individual application.

Inquire! Your communication will receive our immediate attention.

ROBERTS
The WESTERN STATES MACHINE COMPANY
HAMILTON, OHIO, U. S. A.

acid. Both 4M urea and sodium hydroxide cause slow peptization.

Potential applications, according to the manufacturer, include rubber dusting, flatting agent in lacquers, detackifying agent for rubber articles formed by the dip method, anti-halation powder for the back of photographic films, prevention of sticking of viscous materials to container walls, lubricating agent, and cosmetic powders.

National Starch Products, Inc., 270 Madison Ave., New York 16, N. Y.

ANTIBIOTIC:

Terramycin (160a)

Another step forward in man's search for disease-conquering agents has been attained by the discovery and development of a potent new antibiotic, Terramycin, by Chas. Pfizer & Co., Inc. Terramycin is the result of an intensive research program that involved the testing of over 100,000 soil samples. The new antimicrobial substance was first isolated in the Pfizer research laboratories during 1949. Terramycin, grown from the newly discovered actinomycete, *Streptomyces rimosus*, was so named because of its terrene origin.

The new antibiotic has been found in laboratory studies to be highly effective against a wide variety of pathogenic microorganisms. Experimental data indicate that Terramycin offers great promise in the treatment of many infectious diseases. Until clinical studies have been completed, however, it must be emphasized that its true value as a chemotherapeutic agent in man will not be known.

Terramycin is absorbed readily into the body following administration by mouth or by injection. Oral administration of a drug allows effective treatment with a minimum of discomfort to the patient. Animal studies indicate that the toxicity of Terramycin is extremely low, a fact that is most important, inasmuch as toxicity is often a stumbling block in the final development of a new antibiotic.

Preliminary clinical studies of Terramycin have been initiated at the New York Hospital-Cornell University Medical Center, New York, and

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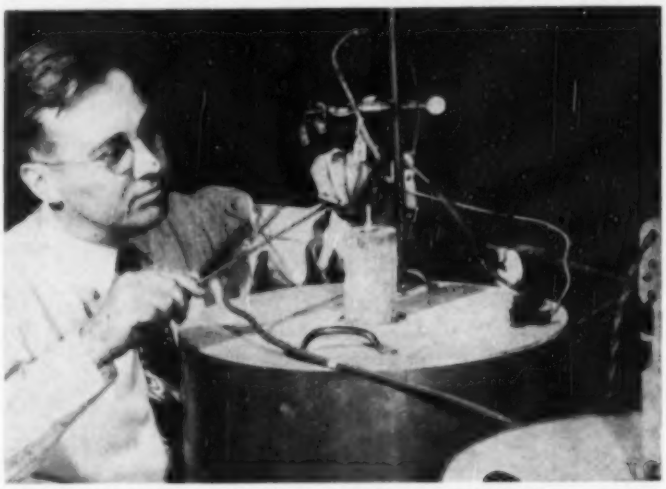
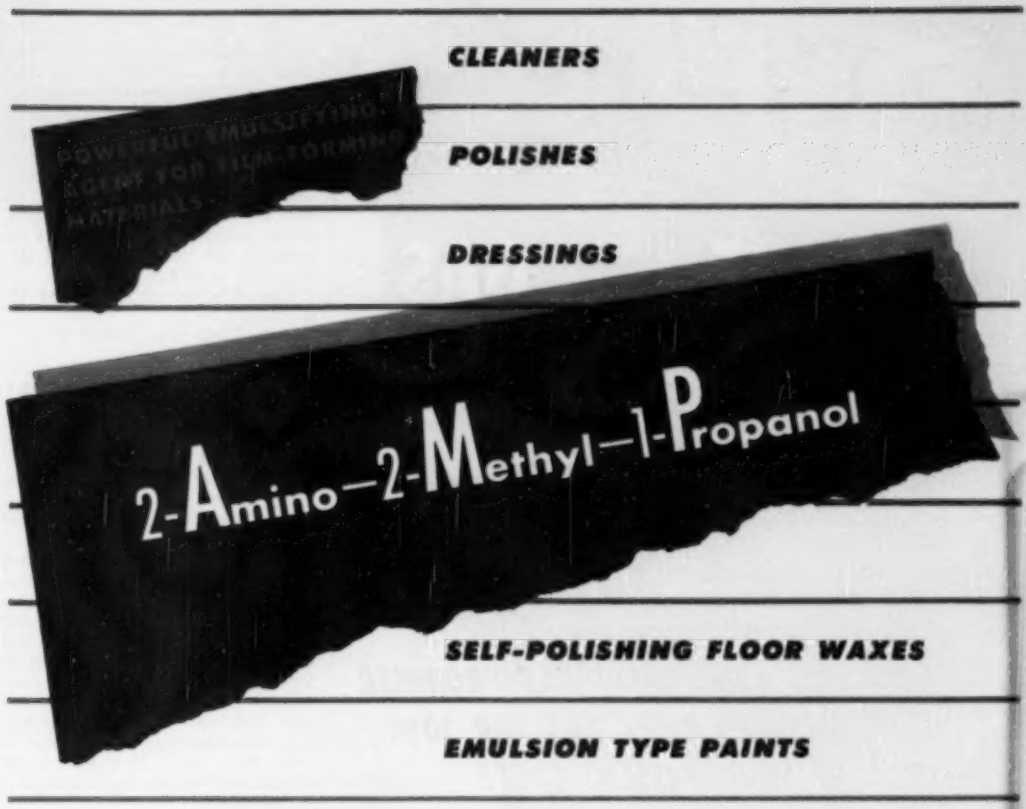


MAKING SYNTHETIC MICA AT THE BUREAU OF STANDARDS (160b)

From a mixture of 36 percent silicon dioxide, 13 percent aluminum oxide, 28 percent magnesium oxide and 23 percent potassium fluorosilicate, a synthetic mica with the formula $K_2Mg_6Al_2Si_6O_{20}F_4$, equivalent to a natural mica in which the hydroxyl radical has been replaced by fluorine, is being produced by the National Bureau of Standards. The mixture of quartz, bauxite and magnesite is first calcined at 1,000 deg. C. to drive off carbon dioxide and water. To introduce fluorine, which effects crystallization without high pressure, the potassium fluorosilicate, only unusual ingredient, is added. Then the completed charge is lowered into position in this special electric furnace and melted at nearly 1,400 deg. C. As the furnace cools, mica crystals grow from a seed at the bottom of the platinum-lined crucible. Thermocouples provide a thermal history of the crystallization. Dielectric constant of the synthetic mica is about 6.3. This discovery could pave the way for U. S. production of this strategic material. During 1948 the United States imported over 10,000 tons of high-grade natural mica, valued at more than $15 million. National Bureau of Standards, U. S. Department of Commerce, Washington 25, D. C.



PROPERTIES OF PURE MATERIAL

Molecular Weight	89.14
Melting Point, °C	30 to 31
Boiling Point, °C	165 at 760mm
Specific Gravity	0.934 at 20/20°C
pH at 20°C of 0.1M Solution	11.3
Vapor Pressure at 20°C	approx. 1mm
Flash Point (Tag. open cup)	159°F
Solubility in Water g/100 ml at 20°C	completely miscible
Index of Refraction at 20°C	1.449

AMP IS AN OUTSTANDING emulsifying agent for film-forming materials and imparts excellent water resistance to the film.

The higher fatty acid soaps of AMP possess extremely high emulsifying efficiency and are stable in color. AMP's moderately high boiling point (165°C) minimizes evaporation loss and objectionable fumes during manufacture of emulsions—without detracting from desirable water resistance and durability of the film.

With its advantage of low combining weight (89.14) and its ability to emulsify a wide range of materials, AMP may solve your emulsification problem. Write, wire, or phone CSC today for additional information.

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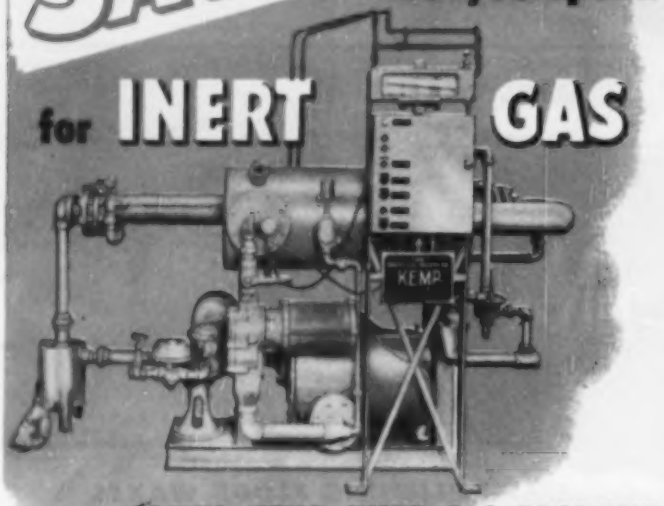
Formaldehyde • Methanol • Amines • Nitroparaffins • Crystalline Riboflavin

SAVE! $9 of every $10 you spend for INERT GAS



THIS KEMP INERT GAS PRODUCER DELIVERS INERT GAS FOR 10% OF YOUR PRESENT COST!

DON'T pay premium prices for your inert gas! This Kemp *Inert Gas* Generator produces inerts at a saving of 83% to 90%. Saves you money no matter whether you use bottled inerts or produce them with old-fashioned, fuel-hungry equipment. This *fully automatic* Kemp Generator has push button starting . . . automatic proportioning over full operating range and automatic fire check.

ABSOLUTELY DEPENDABLE

Kemp Generators burn ordinary gas just as it comes from the mains. A famous Kemp Carburetor, part of each installation, assures *complete combustion* . . . producing a clean, chemically inert gas containing 88% nitrogen, 12% CO_2 . . . a gas so pure it is used *without further processing* in the manufacture of *aspirin* and *laboratory chemicals*, fine paints, and many other products.

SEND FOR PROOF!

Whether you need inerts for purging, fire-protection, mixing, blanketing or a special application . . . specify Kemp. For technical information write for special bulletin. *To find out how much you can save:* tell us what you spend for inerts now. Then let us show you how much Kemp saves you per mcf. *Mail coupon today!*

KEMP *INERT GAS GENERATORS*

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CARBURETORS
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ATMOSPHERE & INERT GAS GENERATORS
ADSORPTIVE DRYERS
METAL MELTING UNITS
SINGEING EQUIPMENT
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THE C. M. KEMP MFG. CO., Dept. F-3,
405 E. Oliver St., Baltimore 2, Md.

Gentlemen: Send me information. Also show me how much we can save on inerts.

Name .....

Company .....

Address .....

City ..... Zone ..... State .....

are now being expanded in many hospitals throughout the nation and abroad. These clinical studies on Terramycin are designed to evaluate its effectiveness in man in the treatment of pneumococcal pneumonia, virus pneumonia, hemolytic streptococcal infections, staphylococcal infections, undulant fever, whooping cough, enteric and urinary tract infections, and certain rickettsial diseases such as typhus fever.

Chas. Pfizer & Co., 11 Bartlett St., Brooklyn 6, N. Y.

NON-STICKING:

Silicone Emulsion (162a)

A new General Electric silicone mold release emulsion called GE 81161 has just been introduced for use on molds for rubber tires, soles and heels, rubber and vinyl floor tiling, and plastics. This emulsion is diluted and used as a spray on the molds.

Possessing stability to heat, hard water, freezing, mechanical agitation and centrifuging, this emulsion has been engineered to prevent the molded part from sticking to the mold. It will resist temperatures as high as 250 deg. C., does not decompose to produce gases, tarry residue and build-up. This characteristic helps eliminate gas pockets that so often cause rejects. It also eliminates the danger of discoloring light-colored molded parts.

When applied in dilutions of 0.5 percent and in some cases 0.25 percent, this emulsion may be applied to the mold with a spray gun or atomizer. Since there are no solid particles in this emulsion, it will not clog the nozzle of such equipment.

General Electric Co., Chemicals Division, Pittsfield, Mass.

PERMITS PLATE POLISHING:

Letterpress Ink (162b)

Printers can now take advantage of the record low costs of Celanese acetate sheeting, which is priced at from 11 to 15 percent less than other commonly used plastics for printing.

Development of a new letterpress acetate ink that permits plate polishing of printed acetate sheets is good news for the printing industry. This ink will not "lift" during polishing, thus eliminating the need for laminating over the printed sheet with a thin film. Price markers, calendar cards, pocket rules and certain types of packages are some of the items whose manufacture will be affected.

The new Celanese sheet has de-

(*Continued*)

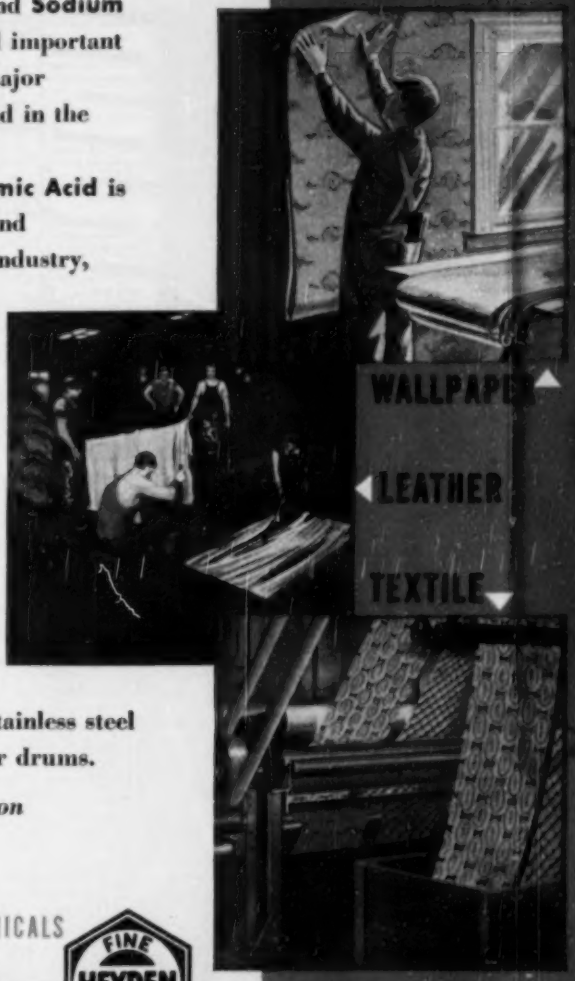
HEYDEN

FORMIC ACID and SODIUM FORMATE

Heyden Formic Acid (85% and 90%) and **Sodium Formate** are used extensively in several important and diversified industries. They serve major roles in the textile and leather fields, and in the production of wallpapers.

In the textile industries, **Heyden Formic Acid** is employed in the dyeing, mothproofing and impregnating of fabrics. In the leather industry, it inhibits mold growth and is used for deliming, pickling, swelling, soaking, disinfecting and tanning of hides.

Sodium Formate is used as a mordant in dyeing and printing, as a humectant, and in the chrome tanning of leather. It has given very satisfactory results in the production of water-resistant wallpapers.



Containers: Formic Acid is shipped in 125 lb. carboys or 500 lb. stainless steel drums; Sodium Formate in 300 lb. fiber drums.

Samples mailed promptly upon request on company letterhead.

Serving Industry THROUGH FINER CHEMICALS

FINE HEYDEN CHEMICALS

HEYDEN

CHEMICAL CORPORATION

393 SEVENTH AVENUE, NEW YORK 1, N. Y.
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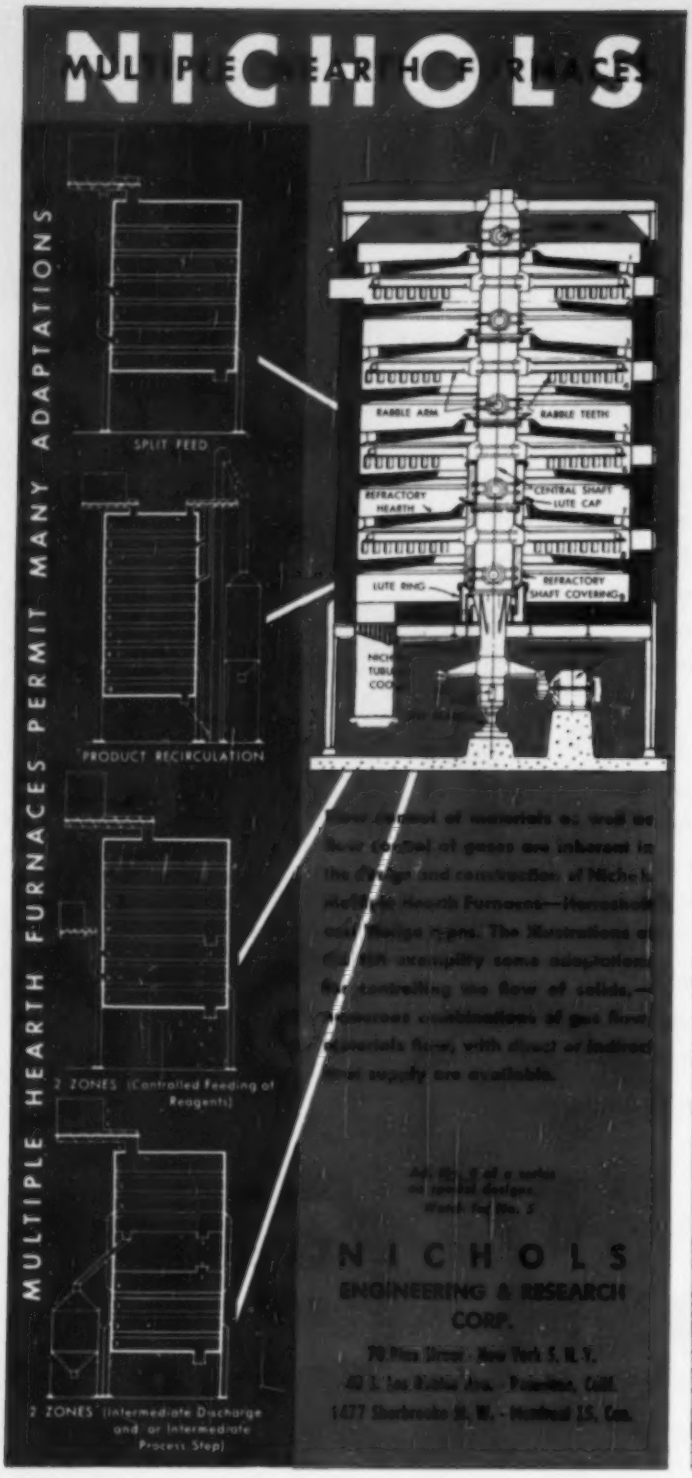
Benzaldehyde • Benzoates • Benzyl Chloride • Benzoates
Chlorinated Aromatics • Chlorobenzenes • Creosotes • 2,4-D • Formaldehyde
Formic Acid • Glycerophosphates • Guaiacols • Hexamethylenetetramine
Methanol Colloids • Methylene Disalicylic Acid • Paraformaldehyde
Pentaerythritol • Penicillin • Pentaerythritols • Propyl Gallate
Quaiacols • Salicylates • Salicylic Acid • Sterculic Acid



veloped to the point where special printing types of this white nonflammable acetate are carried in stock, readily available. These formulations impart dimensional stability sufficient for most printing applications and retain other characteristics that make the sheet ideal for printing. Other qualities are thin-gage toughness and shock proofness, ease of scoring, clean precise parting, color stability, good general resistance to moisture and fats, and stability over a broad range of temperature.

Letterpress acetate ink, a development of International Printing Ink Division of Interchemical Corp. working with the laboratories of the plastics division of Celanese Corp. of America, is suitable for use on job, flat-bed or cylinder letterpresses. Drying can be accomplished with any conventional method and drying time varies with individual printing practices and equipment.

Letterpress acetate ink, which is priced in the same range as other "plastic" inks used for vinyl, Celluloid and other materials, is available from Interchemical's IPI division.

For the graphic arts industry, Celanese also stocks a complete inventory of acetate sheeting in rolls in a variety of colors and gages. Included are stock sheets in a bright cerise in 0.015 and 0.020 in., suitable for embossed or stamped-out letters.

Celanese Corp. of America, 180 Madison Ave., New York 16, N. Y.

CUTS GREASE:

Cold Liquid Cleaner (164a)

A new cold liquid cleaner, particularly suitable for use on electric motors and generators of different sizes, but also effective for general machine and automotive maintenance, has come through extensive field tests successfully, reports E. I. du Pont de Nemours & Co., Inc., its manufacturer.

The new mixture, which makes possible rapid and low-cost cleaning, was formulated by workers in the Electrochemicals Department of Du Pont to meet a long-standing industrial need. During the last year, tests under actual service conditions and industrial routine usage have shown that this compounded product, called Cleaning Mixture No. 49, possesses the qualities required of an effective cold spray for use in electric motor cleaning, automotive repair and general maintenance. It dissolves grease rapidly, evaporates quickly, and is practically inert to ordinary electrical insulating materials.

Composition of the mixture is 30 percent by volume of Blend CC No. 49 and 70 percent Stoddard Solvent. Blend CC No. 49 is now available from Du Pont distributors, many of whom are also able to supply the complete mixture. Stoddard Solvent is generally available, but is not manufactured or sold by Du Pont. Service shop owners and industrial maintenance departments can also prepare the mixture themselves, since they can readily purchase the ingredients.

Because of its low flammability and mild toxicity, Cleaning Mixture No. 49 is easily handled. These features, together with its service performance, make it an acceptable substitute for other compositions that have heretofore been generally used in electrical maintenance.

E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del.

COMBATS SULPHIDE:

Corrosion Inhibitor (165a)

Sulphide corrosion in producing oil wells presents a tough problem. But Humble Oil & Refining Co. has come up with a new inhibitor, to be marketed under the trade name Corexit, that will help to lick it.

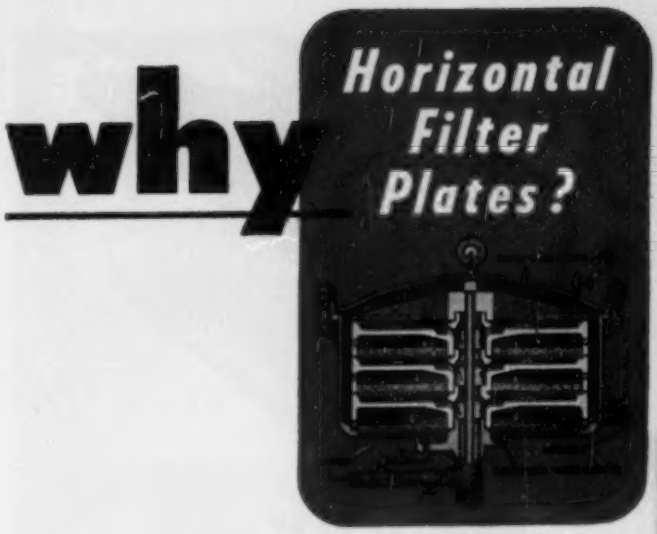
This serious problem of corrosion of tubing, rods, pump parts, wellhead fittings and flow lines of oil wells producing fluids containing hydrogen sulphide has long bothered oilmen. There are now three methods of attempting to control corrosion: use of protective coatings, alloy steels and chemical inhibitors.

Chemical inhibitors have come into general use only recently. Corexit, Humble's inhibitor to combat corrosion, incorporates the following desirable properties: it is a free-flowing liquid; it has no objectionable odor; it is non-toxic; and it is available at reasonable cost.

Field trials of various inhibitors were made for several years in sour crude areas of West Texas. In these trials an initial amount of the inhibitor, usually 5 gal., was batched into the annulus and by a simple piping arrangement the inhibitor and well fluids were circulated for 24 hr. in the closed system consisting of annulus and tubing. Continuous injection by chemical feeder or daily batch injection by gravity-feed lubricator was then started.

One test of Corexit was started in W. R. Settles 11 and 12, Howard-Glasscock field, early in 1949. Each of these wells pumped continuously from a depth of about 2,400 ft. and produced about 30 bbl. each of oil and water per day. Rod failures were

(Continued)



because—with horizontal plates, filter aids are permitted to flow in a natural direction, with gravity, and are deposited in an even cake of uniform thickness.

because—the filter cake rests flat on the supporting plate without tensile or distortive strain, will not crack, slip, or break under pressure, assuring even filtration.

because—any filter paper, cloth, screens, or filter media can be used. Strength in the cake itself is not important, pressure simply presses the cake more firmly on the supporting horizontal plate.

because—horizontal plates are bolted together in a unit that is easily removed for cleaning. An extra unit assembly of horizontal plates can be immediately placed in the filter and the filtering process continued with slight interruption.

This is only part of the story—other exclusive features like the patented scavenger plate that makes possible the recovery of the last of a batch run and other operating advantages are reasons why Sparkler Horizontal Plate Filters are so widely used in the chemical processing industry.

SPARKLER horizontal plate FILTERS

Our filtration engineers are ready to cooperate in solving any of your filtering problems. Write E. S. Anderson, Industrial Department, for personal attention.

SPARKLER Manufacturing Co.

Victor formic acid is applied to a wide range of products and processes. A few of these applications and other information are listed below. Upon investigation you may find that Victor formic acid can advantageously be applied to your product or process. We will be pleased to receive your inquiry and work with you.

USES OF VICTOR FORMIC ACID:

- ACIDIFYING DYE-BATHS
- TANNING
- SOURING IN LAUNDRIES
- PLATING BATHS
- COAGULATION OF LATEX
- WIRE STRIPPING COMPOUNDS
- MANUFACTURING FORMATES, FUMIGANTS, PHARMACEUTICALS, ALLERGY DRUGS, SOLVENTS FOR PERFUMES, LACQUERS

Victor formic acid is a colorless, corrosive liquid which evaporates completely on exposure to the air and has a characteristic pungent, penetrating odor. While milder than the ordinary mineral acids, it is the most active, volatile organic acid. It is available in concentrations of 85% and 90% and shipped in 13 gal. glass carboys (130 lbs. net) and 55 gal. stainless steel drums (550 lbs. net).

VICTOR CHEMICAL WORKS

Write for Technical Data and Experimental Samples

VICTOR CHEMICAL WORKS

141 West Jackson Boulevard Chicago 4, Illinois

few, but tubing failures were frequent. A string of tubing that consisted partly of 600 ft. of new plastic-coated pipe and partly of black pipe in good condition was installed in Settles 11 in January 1948. When this string was pulled for inspection late in the year, it was found that many of the joints of both new and second-class pipe were badly corroded and the mud anchor was completely penetrated.

Injection of Corexit was started in Settles 11 in February 1949. Since the start of the test there have been no tubing leaks in this well resulting from corrosion. After the initial treatment, the inhibitor was used in amount such that the daily cost of chemicals ranged between 50¢ and $1.

It is likely that there are many moderately corrosive wells that can be satisfactorily treated at low cost with resultant net savings of several hundred dollars per well per year.

Humble Oil & Refining Co., P. O. Box 2180, Houston 1, Tex.

RESISTANT:

Vinyl Coating (166a)

After nearly three years of exhaustive tests in the field, a new plastic coating for petroleum and chemical tanks has been announced by the Glidden Co.

Called Vinyl-Cote, the new coating is an impervious tank-lining that does not blister and that eliminates the peeling common to old-style plastic coatings. The field tests show that it combats corrosion and withstands sour crude, salt water, alkalis, acids, and corrosive gases and fumes.

Vinyl-Cote's important new properties are derived from the vinyl copolymer resins used in its production. They give it wide flexibility and amazing resistance to caustic, sour crude and most acid solutions. The new coating also is almost totally unaffected by oils, greases and petroleum solvents. It stands up well against aromatic solvents.

However, Glidden technicians point out that Vinyl-Cote is not specified for some applications. It is readily soluble in the ketone and ester group of solvents, and its resin films will not withstand operating temperatures above 180 deg. F.

Vinyl-Cote is a five-coat system, with each coat a different color, and should be carefully applied under the proper conditions. Glidden specifies the exact thickness of each coating, although this is simplified through the use of different colors. When the coat being applied completely covers the

previous coat, the proper thickness has been attained.

The first test applications of Vinyl-Cote were made nearly three years ago in actual tanks in the Gulf Coast and midwestern oil fields. Today these coatings are still in excellent condition.

Glidden Co., 11001 Madison Ave., Cleveland 2, Ohio.

HAS LESS ODOR:

Plasticizer (167a)

Its new dioctyl phthalate plasticizer has recently been improved by B. F. Goodrich Chemical Co. The product, Good-rite GP 261, is now odor free, has low acid number and crystal-clear color.

Technologists have tried to minimize plasticizer odor. Processors regard plasticizer odor as an undesirable feature because of the strong objection of buyers to end products (for example, raincoats, table cloths and upholstery) that possess odor. This improvement by Goodrich technical men will not result in total elimination of odor in finished products, but will markedly reduce odor level. Other compounding ingredients, of course, can also affect odor or lack of it in finished plastic products.

The improved GP 261 has a Hazen number, water-white color rating, under 100. Its reduced acid number, under 0.05, should indicate to processors its outstanding stability and freedom from volatile substances.

Improvements have been achieved with no sacrifice of other plasticizer properties, chief of which is its electrical characteristics.

Available in commercial quantities, GP 261 is a plasticizer for vinyl and synthetic resins, as well as for nitrile rubbers. It imparts to end products such properties as heat and light stability, permanent flexibility, resistance to hydrolysis, low water extraction and good electrical properties.

B. F. Goodrich Chemical Co., 324 Rose Building, Cleveland 15, Ohio

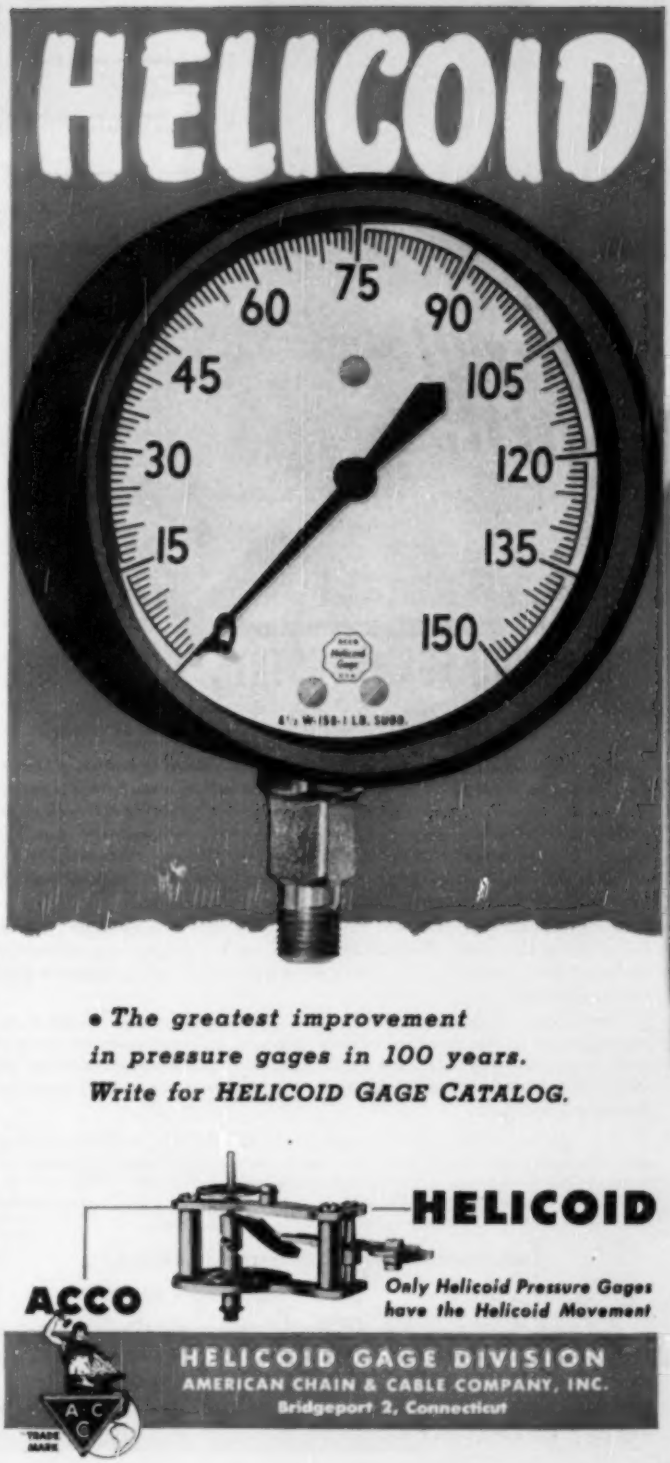
SOFTENS WATER:

Silicate Detergent (167b)

Philadelphia Quartz Co., manufacturer of soluble silicates and Metso detergents, has come up with a new alkaline detergent that licks hard water. It is a cream-colored, granular, free-flowing product, quickly soluble in hot or cold water.

In cleaning operations where water of a hardness of 5, 10, 20 grains or higher is encountered, the new detergent, Metso 55, softens by reacting with calcium and magnesium salts to

(*Continued*)



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ACCO

Only Helicoid Pressure Gages have the Helicoid Movement

HELICOID GAGE DIVISION
AMERICAN CHAIN & CABLE COMPANY, INC.
Bridgeport 2, Connecticut

TOP: General view of the protected area.

CENTER: Foam discharge at the rate of 2 in. per min.

BOTTOM: Area covered by 6 in. of foam blanket in 3 min.

it's NEW!

"Automatic" AER-O-FOAM

PROTECTION FOR INDUSTRY

For many years fire protection engineers have been faced with the problem of finding a feasible answer to the hazard caused by crowded plant facilities where flammable liquids are involved. Conditions of this type exist in many chemical processing industries, metal working plants, petroleum storage and handling and electric power generation properties. A severe hazard was evident at the Schenectady Varnish Company, Schenectady, N. Y., where fire at the tank car loading racks and storage facilities presented a constant threat to the operation of the entire plant.

Having had a background in the development of all types of automatically operated fire protection equipment, "Automatic" Sprinkler engineers designed and installed the mechanical foam system, test photos shown above, and which is now commercially identified as "Automatic" AER-O-FOAM.

The important engineering advantages of this form of protection are evident in the improvement of drainage conditions, reduction of water supply requirements, non-corrosive action of the foam material, positive fire extinguishment and prevention of reflash. As "Automatic" AER-O-FOAM dehydrates rapidly following application, clean-up operations are held to a minimum.

Pump houses, processing buildings, loading and unloading racks, can and drum filling areas, flammable liquid storage and similar hazards familiar to the chemical processing industry can now be positively protected through the media of "Automatic" AER-O-FOAM. Your nearest "Automatic" Sprinkler representative will be glad to show you how and—at no obligation to you. Write or call today for descriptive literature.

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 4, OHIO

"Automatic" Sprinkler

FIRST IN FIRE PROTECTION

DEVELOPMENT . ENGINEERING MANUFACTURE . INSTALLATION

OFFICES IN PRINCIPAL CITIES OF NORTH AND SOUTH AMERICA

form compounds soluble in water. Thus formation of white deposit and hard scale is prevented.

Metso 55 contains special ingredients that provide a moderate amount of suds, as well as fast wetting action on greases and oils. It is also protective to soft metals. Aluminum surfaces exposed to a 0.2 percent solution at boiling temperature for 2½ hr. retain their original brightness.

The new detergent is intended for general industrial cleaning. It is specially recommended for use in dairies, meat plants, bakeries and canneries for manual, tank or steam-gun cleaning. It comes packed in 100-lb. bags and kegs, and in 300-lb. fiber drums. *Philadelphia Quartz Co., 3rd & Ionic St., Philadelphia 6, Pa.*

Briefs . . .

Weapon against mites is the organic phosphorus compound known as EPN, or ethyl p-nitrophenyl thionobenzenephosphate, latest insecticide developed by Du Pont's Grasselli Chemicals Department. Extensive tests confirm its effectiveness against mites and its ability to protect for many weeks against re-infestation. EPN is less toxic to warm-blooded animals than other organic phosphorus compounds used in mite-control sprays. Growers can get substantial quantities for spring use. *E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del.* **(168a)**

Ceramic material that contracts when heated and expands when cooled is being evaluated by Air Force engineers, who believe it may find a wide range of uses in jet engines. Known as stupalith, the new substance is a lithium aluminosilicate processed to develop beta-spodumene, with excess silica molecules forming a solid solution with the beta-spodumene. It can be formed and shaped by pressing, extrusion and casting. *Department of Defense, Room 2C763, The Pentagon, Washington 25, D. C.* **(168b)**

Liquid cleaner that instantly removes unwanted mold lubricants, lacquer, grease stains and foreign matter from polystyrene surfaces is being introduced to the plastics industry by Schwartz Chemical Co., Inc. Called Poly-Kleen, the new nontoxic cleaning compound acts quickly, does not craze or mar the polystyrene itself. It is available in 1-gal. and 5-gal. cans. *Schwartz Chemical Co., Inc., 326-328 West 70th St., New York 23, N. Y.* **(168c)**

—*End*

Finis

FOR THESE TROUBLEMAKERS IN PLANTS EQUIPPED WITH . . . . .

CASH STANDARD *Streamlined* TYPE 1000 PRESSURE REDUCING VALVE

Here's why

IN THE USERS OWN WORDS . . . . .

(Note how users' statements check against the 10 benefit points listed below)

FROM A TIRE COMPANY

"We installed your '1000' reducing valve in our re-capping set-up about six years ago and to this date we have had **trouble-free** service. Periodically I check steam **pressure** and find it to be very **accurate.** I wouldn't hesitate a minute in recommending your Streamlined Reducing Valve."

FROM A BUTTON MANUFACTURER

We use the type '1000' valves on one of the **toughest operations** and they have operated 24 hours per day for the past 2½ years with **no maintenance.**"

FROM A GLASS MANUFACTURER

"We have one set of five pressure reducing valves (CASH STANDARD '1000') on a Hartford Empire ZU forehearth that have **operated accurately** and **trouble free** for five years **without** a dimes worth of **maintenance.**"

FROM A LAUNDRY

"We are well satisfied. We get **accurate pressure control under toughest working conditions — trouble-free service — cost-saving operation and practically zero in maintenance costs.**"

FROM A CHEMICAL MANUFACTURER

"We purchased our first CASH STANDARD Type '1000' Streamlined Valve six years ago and since then we have installed more than 200 of the '1000' valves ranging in size from ¼" to 1½". This is indicative of our complete satisfaction with the operation of the '1000'. A large number of the pressure reducing valves are **operating above your maximum specifications of temperature and pressure** with excellent results.

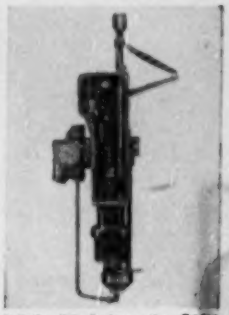
"The **elimination** of **steam leaks** and the **low maintenance** cost have been especially gratifying. The low initial cost, **low maintenance,** and **trouble-free** operation results in the **most economical** pressure reducing valve we have been able to purchase."

1. **Maximum capacity when needed most.**
2. **Accurate pressure control under toughest working conditions.**
3. **Trouble-free service.**
4. **Smooth operation.**
5. **Tight closure.**
6. **Speedier production results.**
7. **Elimination of failures.**
8. **Cost-saving operation.**
9. **No spoilage.**
10. **Practically zero in maintenance.**

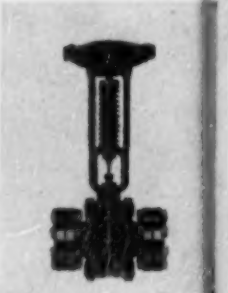
• WRITE FOR BULLETIN 962

BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES

Send for them



Bulletin 963 features the CASH STANDARD Type 100 Series of Super-Sensitive Controllers — various types for automatically operating valves, dampers, rheostats, stokers, pulverizers, fans, and other apparatus. 16 pages filled with descriptions and applications.



Bulletin 968 features the CASH STANDARD Type 24 Pressure Reducing Valve — direct operated — direct acting for handling steam, hot water, cold water, air, oil, brine—and most liquids and gases except some injurious chemicals. Illustrates and describes the different styles available and tells about their applications. Three pages of capacity charts.

Bulletin 956 features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.

CASH STANDARD CONTROLS . . . VALVES

A. W. CASH COMPANY

DECATUR ILLINOIS

CHEMICAL ENGINEERING PICTURED FLOWSHEET

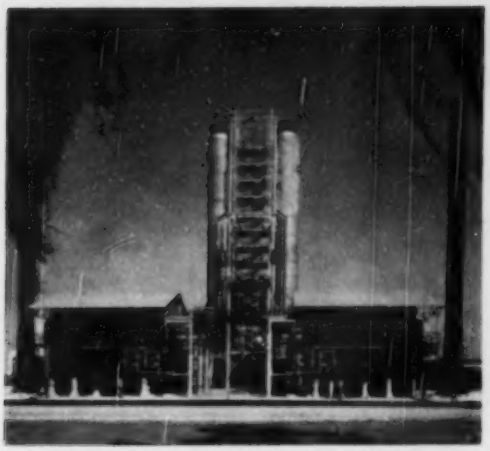
Lube Oils and Paraffin Wax

Article on page 94. Photos by Elwood M. Payne.

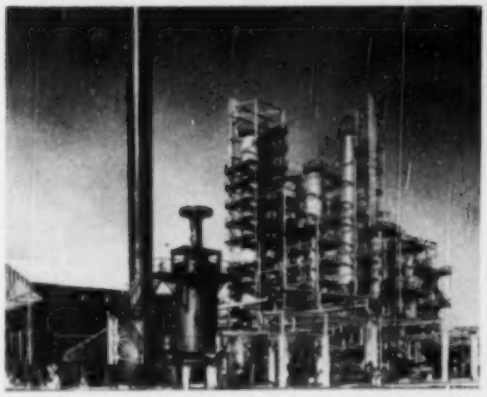
Lube oil stocks and fully refined paraffin wax are produced at Lake Charles, La., refinery of the Cit-Con Oil Co. jointly owned by Cities Service Co. and Continental Oil Co.

To supply feed stock for Cit-Con, selected crudes are run through a topping unit at the nearby Cities Service refinery. The lubricating oil fraction is separated and sent to Cit-Con by pipeline. Feed stock flows first to twin vacuum distillation units. Here, in towers specially designed to achieve close fractionation, the stock is cut into base stocks. Undesirable constitutents are removed from the lighter grades of distilled products by the furfural process. Heavier stocks are refined in the Duo-Sol unit. Dewaxing of all refined stocks by a solvent process in which a blend of methyl ethyl ketone, benzene and toluene is used. There are two of these MEK units. One handles the three lightest distillate stocks. The other processes the heaviest stocks. Dewaxed oils are treated with clay to improve color and stability. They are finished in blotter presses. Final refining of crystalline wax to remove odor and taste, and to improve color, is done in the acid treatment plant. Finally, the wax is percolated through bauxite clay.

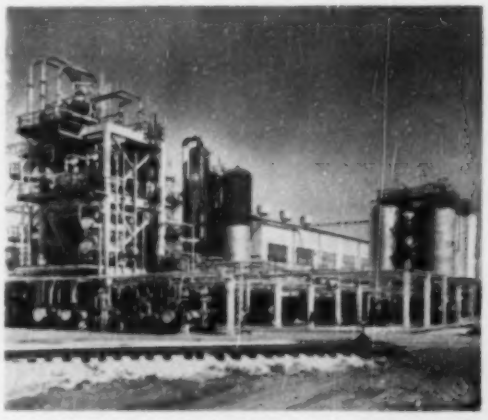
Special equipment protects finished oils in storage tanks from contamination by water through condensation. Mechanically and chemically dried air flows into the tanks to replace oil being withdrawn. The refinery's total capacity is 1,700,000 bbl., in 134 tanks ranking in size from 300 bbl. to 80,000 bbl. Cit-Con's products are shipped by rail and by water. Wax is produced in 10-lb. slabs, and also is shipped in tank cars equipped with steam coils. Both blended oils and base stocks may be shipped either by rail tank cars, loaded at the refinery's loading racks, or by water. Loading pipe lines connect the refinery with docks on the tide water Calcasieu River, two miles away. The docks are 28 miles upstream from the Gulf of Mexico.



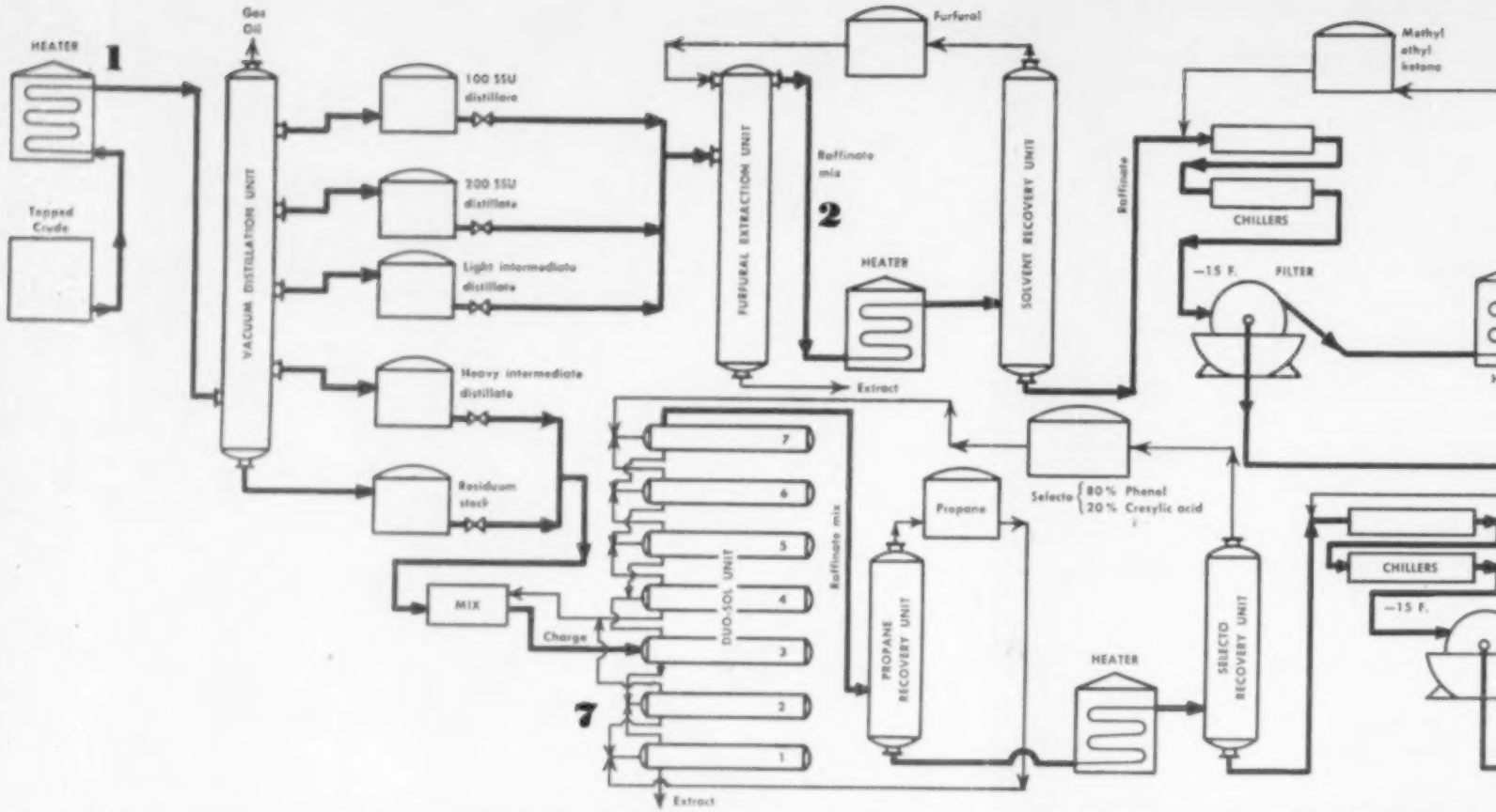
1 Furnaces in foreground heat topped crude for treatment in vacuum distillation towers. Towers use spray trays.

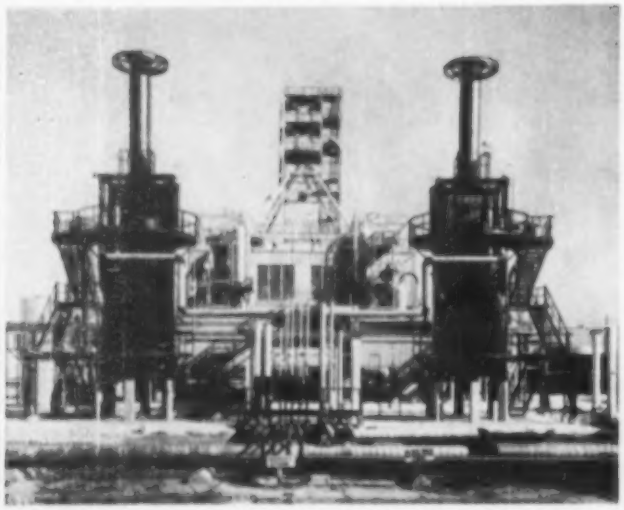


2 Furfural extraction unit is the largest in the world. Lighter grades of oil are treated in this unit.

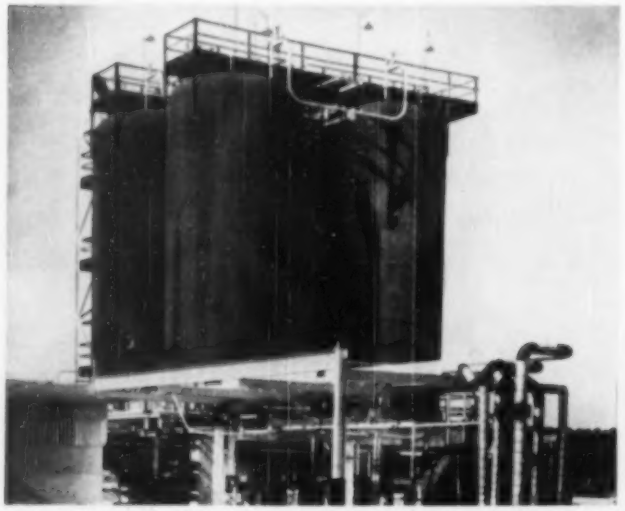


3 MEK dewaxing units separate oil and wax. Solvent tanks are on right, solvent recovery towers are on left.

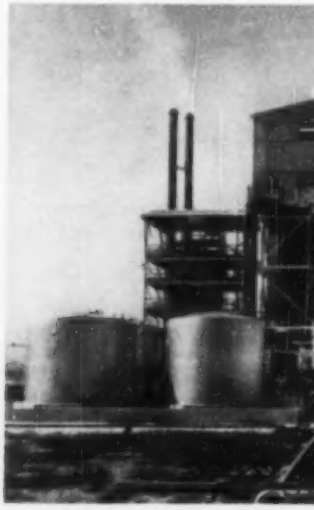




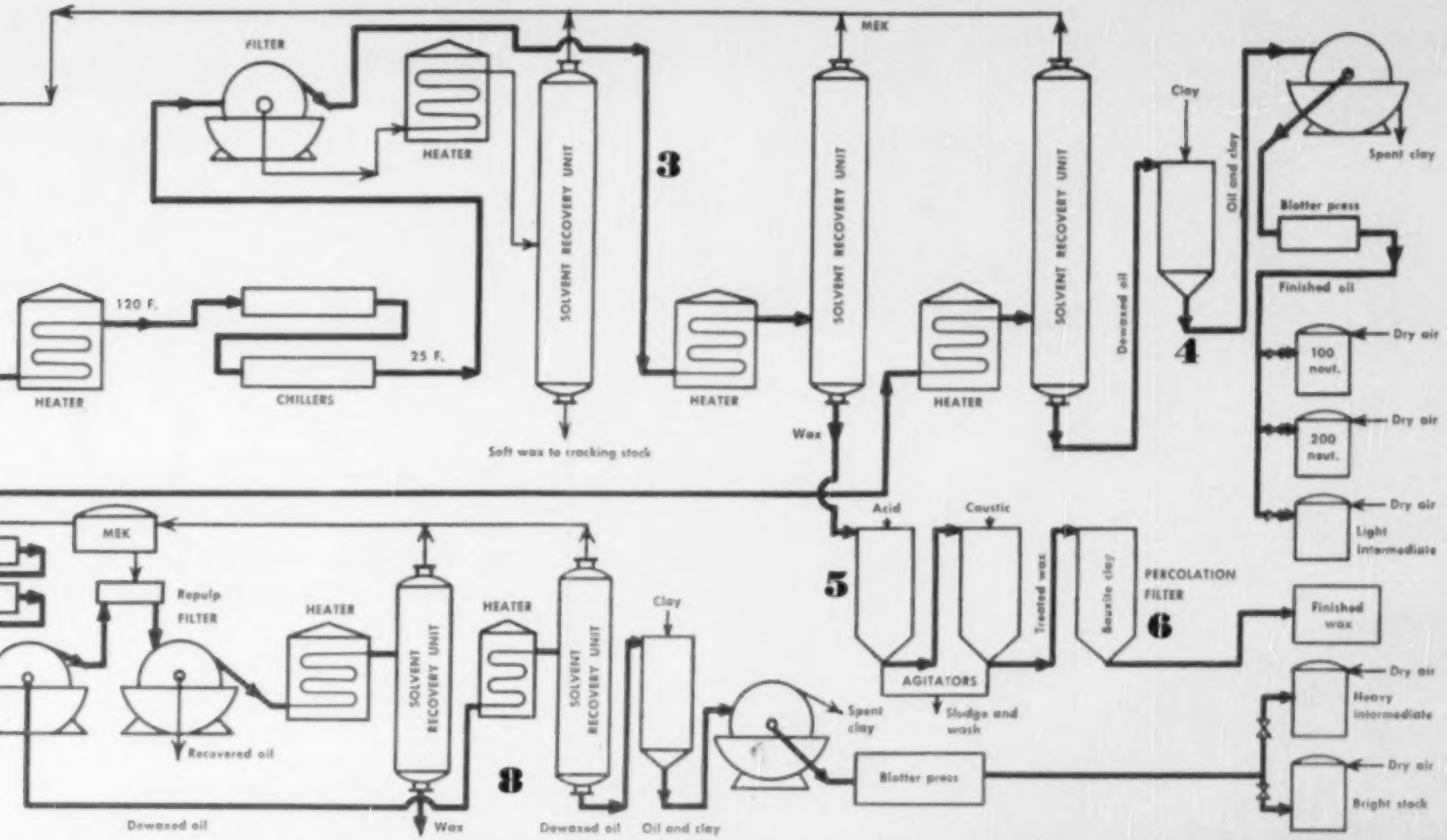
4 Twin clay contact towers improve color and stability. These units have 6,000 bbl. per day capacity. This is final step in refining lube oils.

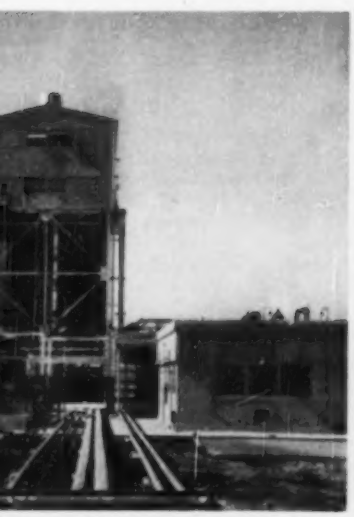


5 Agitators for acid treating and neutralizing waxes. Here they are treated with sulphuric acid and caustic soda. Then waxes go to filters.

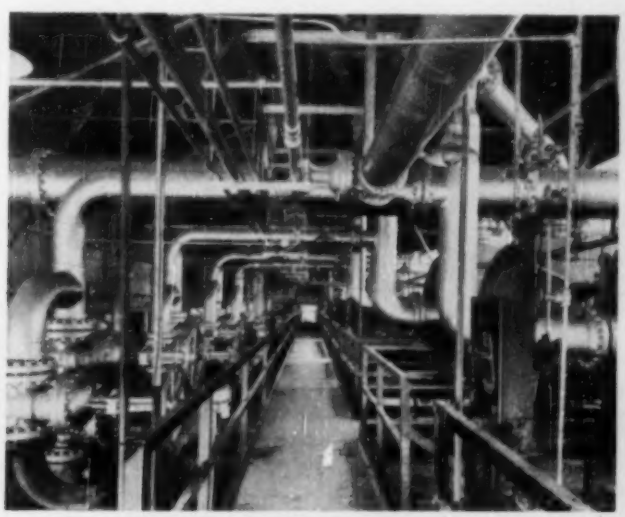


6 Filters containing bauxite clay ar the final treatment for fully refined





lay are used for percolating waxes. This is efined waxes. Product goes to storage.



7 Duo-Sol extraction drums and circulating pumps are used to extract heavy lube stocks. The Duo-Sol unit is the largest in the world.

8 MEK unit where heavier grades of oil are extracted. Waxes from this unit are of the microcrystalline type.

cover

- ☐ FLAT COVER
- ☐ FUME-TIGHT COVER with sight glasses, spray nozzles, feed pipe and vent pipe

case

- ☐ CAST OR FABRICATED STEEL
- ☐ STAINLESS STEEL-LINED
- ☐ MONEL-LINED
- ☐ RUBBER-LINED
- ☐ TO OTHER SPECIFICATIONS

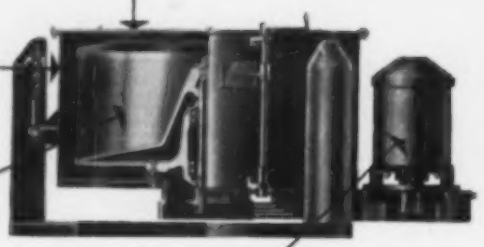
basket

PERFORATE OR IMPERFORATE

- ☐ STEEL
- ☐ STEEL RUBBER-COVERED
- ☐ STAINLESS STEEL
- ☐ MONEL
- ☐ BRASS
- ☐ OTHER ALLOYS

motor

- ☐ OPEN TYPE
- ☐ TOTALLY ENCLOSED FAN COOLED
- ☐ EXPLOSION-PROOF



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In Canada: American Machine and Metals (Canada) Ltd., 1144 Weston Road, Toronto 9, Ontario

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CRANE has everything

BEST BUY FOR MANY CORR

These Crane Ni-Resist Cast Iron Gates g
rosion on many services at moderate cos
and bonnet, has equivalent strength of
has substantially greater resistance to we
Also, these valves are trimmed with Cr
threads outside the valve . . . not exposed

Carefully balanced body and bonnet de
under line strains. Well proportioned st
connection keeps valve operating smooth
mum port openings permit unrestricted fl
or clamp type bonnet, screwed or flanged
See your Crane No. 49 Catalog, page 37
Resistant Circular No. 320.

CRANE CO., 836 S. Michigan Av
Branches and Wholesalers Serving

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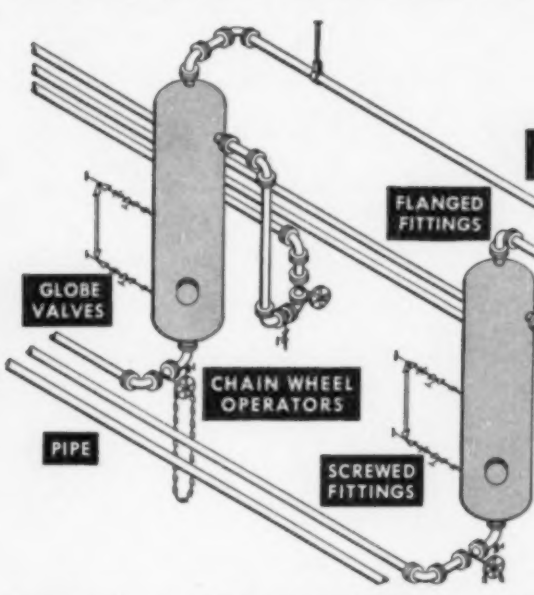

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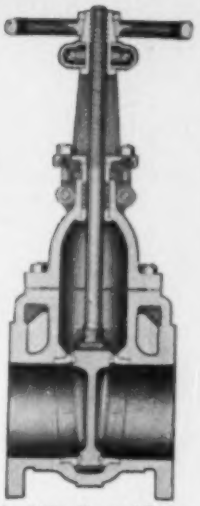

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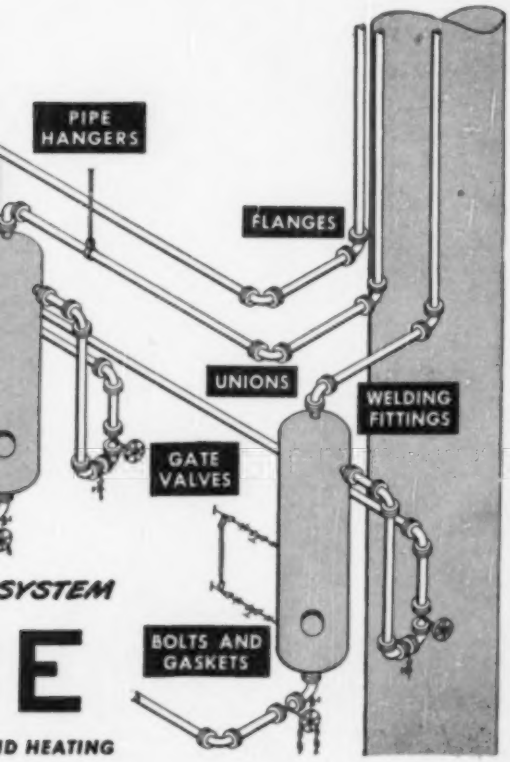

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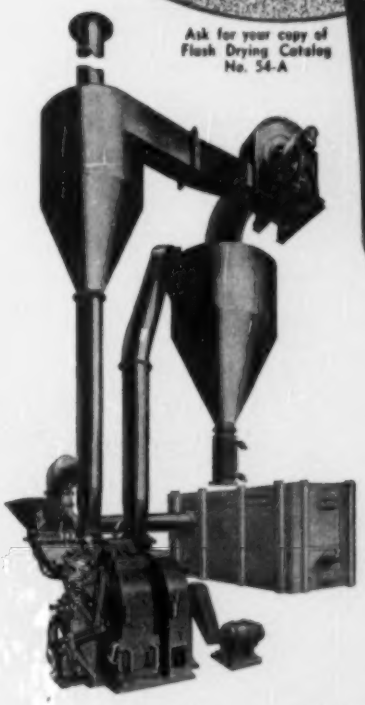

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Chemical Engineering News

JOSEPH A. O'CONNOR, News Editor

New Gas-Fired Furnace Hikes Diamond's Silicate Output

Diamond Alkali Co. is now operating a new, 50,000-ton furnace at its Cincinnati, Ohio, silicate plant. Addition of the new furnace will increase production of silicate of soda and related products at the Cincinnati plant by 50 percent.

The plant now has three 50,000-ton furnaces. The new, gas-fired unit was installed in the furnace building, which was appropriately enlarged and remodeled. Total cost of the expansion project was $300,000.

Latest expansion in plant facilities was due primarily to the growing demand in the oil industry for silica gel catalyst. Silicates also are widely used in the manufacture of laundry soaps and washing compounds, as adhesives in corrugated fiber boxes, and in certain textile-processing and paper-manufacturing operations.

The Cincinnati plant is one of six silicate plants operated by Diamond. The company operates 13 basic chemical plants throughout the country.

Standards Code Thrashed Out For Heat Transfer Equipment

A proposed testing code for sensible heat transfer in shell-and-tube type equipment was presented for discussion by the Committee on Testing Techniques and Equipment Performance Standards of the American Institute of Chemical Engineers at the 42nd annual meeting of the Institute in Pittsburgh. This code is the first in a series of codes governing testing techniques and equipment performance standards for chemical process equipment which the Institute eventually expects to promulgate.

In addition to the subcommittee on heat transfer, other subcommittees are studying evaporators, agitation equipment, pumps, absorbers, dryers and distillation equipment.

The proposed AIChE testing code on heat transfer is primarily designed to provide standard directions for conducting and interpreting performance tests of shell-and-tube type heat transfer equipment for comparison with the manufacturer's predicted performance. An additional purpose is to aid in securing reliable full-scale test data. The code is limited to sensible heat transfer in shell-and-bare-tube type equipment, except that it may be applied to heaters of shell-and-tube construction where saturated steam above atmospheric pressure is the heating medium and where the heat is absorbed as sensible heat.

Procedure now is to secure agreement on the provisions from the users and manufacturers of the equipment. Reviews of the code have already been made by several groups, including oil companies through the American Petroleum Institute and with the American Institute of Mechanical Engineers. The subcommittee is anxious to have the code tried. Should it prove complicated or unwieldy, it will be revised.

The subcommittee on heat transfer consists of W. T. Dixon, Atlantic Refining Co., chairman; W. C. Beekley, Whitlock Manufacturing Co.; P. V. Bitzer, Ross Heater & Manufacturing Co.; A. P. Colburn, University of Delaware; and A. C. Mueller, E. I. du Pont de Nemours & Co.

A preliminary outline of the bubble-cap column section of proposed standards for testing, design, construction and erection of distillation equipment was discussed.

The subcommittee on the performance of absorption towers is drafting a tentative code covering these units and expects to complete its work within the next year. A classification of dryers preparatory to selection of a type for which a testing code can be drawn has been made by the subcommittee on dryers.

Codes under consideration by the other subcommittees are in still earlier stages of development.

Solvent Extractor Works Like Merry-Go-Round

A new soybean processing plant at Indianapolis, reported to be the most modern in existence, has just been turned over by the builder, Chemical Plants Division of Blaw-Knox Co., to the owner, Glidden Co. With its 1,500,000-bu. elevator, the project cost $3.5 million.

Opening of the new plant introduces the first large application of the Blaw-Knox Rotocel, a newly developed solvent extractor designed to give greater efficiency and economy in soya extraction processing.

At the same time it marks the addition of 250 tons daily production to the soybean capacity of Glidden, which has been active in pioneering new uses for soybean products. In addition to producing soybean meal and

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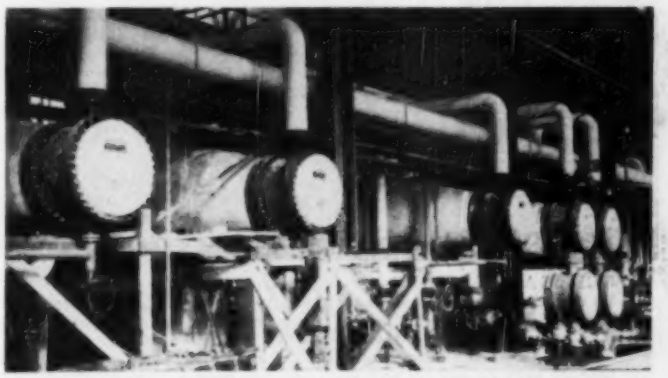

WYOMING PLANT RECOVERS SULPHUR FROM NATURAL GAS

Re-boilers and solution exchange heaters are seen here in the reactivator section of the Worland, Wyo., plant where Texas Gulf Sulphur Co. recovers elemental sulphur from natural gas. In 1949, Texas Gulf got 70,000 tons of sulphur from its Worland plant, a gain of 16,000 tons over output there in the preceding year.

oil, both widely used in foods and the oil in such other applications as paints and varnishes, the plant will recover lecithin, in wide demand as a food emulsifier and for industrial uses.

Distinctive design feature of the Rotocel is that it operates in the horizontal plane with flake-holding baskets on a revolving rotor, in the manner of a merry-go-round. The conventional basket extractor has its process flow in the vertical plane, on the order of a ferris wheel.

Among the advantages reported for the Rotocel design are large savings in building height, the presence of a fully counter-current flow of the solvent throughout the cycle, a reduction in equipment (the rotor is the only major moving part), ease of operation and more complete extraction of the oil.

The new plant includes facilities for bean grinding, conditioning and flaking; solvent extraction and solvent recovery; oil desolventizing and degumming; meal desolventizing, deodorizing, toasting, grinding, sifting and bagging; and crude lecithin manufacture.

Mechanical refrigeration eliminates the need for extensive supplies of cooling water. Modern instrumentation provides selective, automatic controls.

Utilization of Bagasse By Paper Makers Forecast

Commercial production of pulp and paper from bagasse is a definite possibility. That's what Robert C. Hockett, director of the Sugar Research Foundation, Inc., New York, told the Southern Association of Science and Industry meeting recently in New Orleans. He said that there are 4 million tons of bagasse produced annually in Louisiana alone, but of this only about one quarter of a million tons is put into commercial use of making wall board.

Utilization of waxes and fats now thrown away in the "clarification mud" residue in grinding was also predicted by Dr. Hockett. There is a potential production of 29 million pounds of light-colored refined wax from this mud, he added, which may be used to take the place of other vegetable waxes now imported.

William M. Murray, Jr., director of the Southern Research Institute, Birmingham, reported on another new raw material for the production of pulp and paper. He proposed the use of discarded railroad ties and utility poles. Every year about 3 million tons of these materials is available. And it is costing the railroads about $2 million annually to dispose of the ties. The new paper, he said, is a good quality kraft, and may be used for bags or mapping paper.

Development of an insect-repellent cotton bag was reported by James A. Kime of the Southern Research Laboratory, New Orleans.

New hybrid pine trees, which are likely to do for our depleted forests what hybrid corn has done for the farmer, were discussed by Victor H. Schoffelmayer, president of the Texas Chemurgic Council and science editor emeritus of the *Dallas Morning News*.

The convention's theme this year was the contribution of scientific research to the development of agricultural industries in the South, according to S. J. Lloyd, president of SASI and professor of chemical engineering, University of Alabama.

IN BUSINESS AGAIN

To celebrate the shipment of the first potash since the strike, the managers of the three big plants were dragged from work to have their picture shot. P. S. Dunn (Potash Co. of America), Nelson White (International Minerals & Chemical Corp.) and Henry Bruhn (United States Potash Co.) seem happy to have the Santa Fe haul the stuff off to America's farmers. They are also anxious to get back to work. The strike that ended after 73 days of lost production means that the potash supply will be 150,000 tons short of the 600,000 needed before April 1. Farmers in the South and Midwest will be hardest hit. Workers went back on the job February 1 under the old contract with minor changes but not the 25c. per hr. wage hike demanded.

Phillips Butadiene Plant Sets New Safety Record

Dedication ceremonies at the Plains butadiene plant, near Borger, Tex., on January 31, marked the achievement of a new safety record for all Phillips Petroleum Co. installations as plant employees added a peak to their Monument of Safety, a symbol of 3,000,000 consecutive man-hours worked without time lost due to injuries.

This outstanding safety record, completed on January 27, covered a period of 23 months beginning on Feb. 26, 1948. The first million hours were completed on Oct. 6, 1948, and the second on May 22, 1949. The Plains plant, operated by Phillips Chemical Co., a wholly owned subsidiary of Phillips Petroleum Co., was also the first plant in the Phillips organization to reach the two million hour mark.

In addition to setting a record for all Phillips plants, the three million hour record of the Plains plant tops all safety ratings in Rubber Reserve plants and is at or near the top for all petroleum plants.

At the dedication ceremony, R. M. Wallace, superintendent of the plant, was high in his praise of every employee for becoming safety conscious.

"To establish such a record, one man would have to work 24 hours a day, every day of the year for 342 years," Wallace told employees at the ceremony. "By our continuing to take advantage of all the safety devices

(Continued)

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employed in the plant and by observing all the safety precautions developed through experience and study, we can reach our new goal of four million man-hours without a lost-time injury."

Wallace has been superintendent throughout the three million hour period. O. D. Henderson is safety director at the plant, assisted by L. D. Baker and C. W. Williamson.

Phillips has operated the government-owned plant since its opening June 1, 1943. The plant manufactures butadiene, principal ingredient of synthetic rubber. More than 650 persons are employed at the plant at the present time.

Bain Is Guest Speaker As American SCI Section Meets

Sir Frederick Bain, Kt., M. C., deputy chairman of Imperial Chemical Industries, Ltd., was the guest speaker at the 57th annual meeting of the American Section, Society of Chemical Industry, Friday, February 17, 1950, in the Music Room of the Hotel Biltmore, New York, N. Y. Sir Frederick's topic was "The Shape and Development of the Chemical Industry."

Gustavus J. Esselen, chairman of the American Section, presided at the meeting, which was preceded by a dinner.

Sir Frederick Bain was president of the Federation of British Industries from 1947 to 1949 and is a key figure in the chemical industry of Great Britain. He was deputy director of Chemical Warfare Supply for his country from 1916 to 1918 and chairman of the Chemical Control Board from 1941 to 1944. He also was chairman, Chemical Planning Committee, 1942-1944; vice president, British Employers' Confederation; and vice chairman, Association of British Chemical Manufacturers. He has served on many other government trade committees and labor councils.

MIT Colloid Course Aimed At Rubber and Plastics Experts

A special three-week course in the colloid chemistry of elastomers, from June 26 to July 14, a feature of the 1950 summer session at the Massachusetts Institute of Technology, has been announced by Professor Walter H. Gale, director of summer session activities.

Designed primarily for engineers and scientists from the rubber and plastics industries, the course will be given by Dr. Ernst A. Hauser, professor of colloid chemistry in the Institute's department of chemical engineering and a leading authority in the field.

Beginning with an introductory review of modern colloid chemistry and its importance in understanding the elasticity of natural and synthetic substances, the course will cover the following subjects: the chemical composition and molecular structure and configuration of matter exhibiting elasticity; techniques necessary to a study

CRUDE PUMPED FROM BARGES IN RECORD TIME

A new record for pumping out crude oil barges on the Mississippi was recently set at Northwestern Refining Co.'s docks in St. Paul, Minn. Doing the lion's share of the job were four Waterous rotary cargo pumps. With this equipment, a tow of 48,000 bbl. (equal to 200 railroad tank cars), delivered to St. Paul by the tugboat Meriweather Lewis, was emptied in less than 9 hr.

of these factors; colloidal phenomena involved in the production of synthetic elastomers; variations found in the properties of elastomers due to different types of polymerization; changes polymers undergo and interfacial reactions that take place in various manufacturing processes; modern developments in the field of compounding ingredients; and the current status and future possibilities of silastics, a new branch of colloid chemistry dealing with the element silicon.

The special course is part of a broad program of summer activities at MIT, designed to make the Institute's special facilities available to technical and scientific personnel who are not able to participate in the Institute's regular academic work.

Biochemical Engineering Inaugurated at Princeton

A new program of studies, broadening the base of Princeton University's engineering science program and placing emphasis upon chemical engineering, biology, chemistry and mathematics, is proving successful in its first year of operation in preparing men for careers in biological industry.

(*Continued*)

CONVENTION CALENDAR

American Chemical Society, 117th national meeting (divided), Houston, March 26-30, Philadelphia, April 9-13, Detroit, April 16-20.

Western Petroleum Refiners Association, 38th annual meeting, Plaza Hotel, San Antonio, Tex., March 27-29.

American Drug Manufacturers Association, Boca Raton Club, Boca Raton, Fla., March 27-30.

National Plastics Exposition, Navy Pier, Chicago, March 28-31.

National Association of Corrosion Engineers, 6th annual conference, Jefferson Hotel, St. Louis, April 4-7.

National Production Exposition, Chicago Technical Societies Council, Stevens Hotel, Chicago, April 4-8.

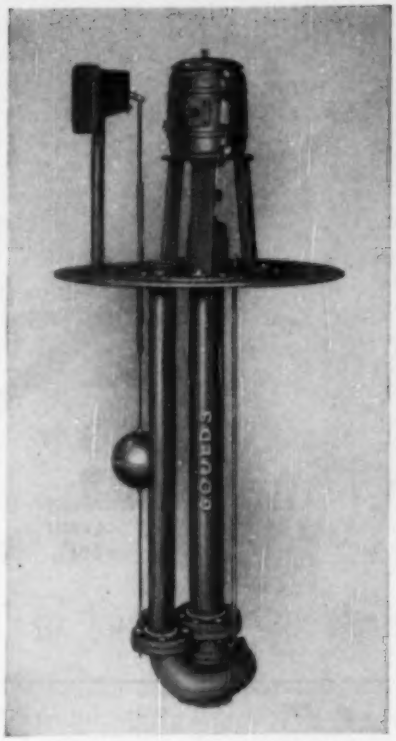
American Institute of Chemical Engineers, Ohio and Pittsburgh Sections, symposium on development and marketing of chemical products, Case Institute of Technology, Cleveland, April 14.

Electrochemical Society, annual meeting, Hotel Statler, Cleveland, April 19-22.

Association of Consulting Chemists & Chemical Engineers, Hotel Shelbourne, New York, April 25.

American Wood Preservers Association, annual meeting, Rice Hotel, Houston, April 25-27.

American Oil Chemists' Society, spring meeting, Atlanta Biltmore Hotel, Atlanta, May 1-3.



Goulds vertical centrifugal Fig. 3047

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This rugged, heavy duty sump pump gives exceptional service in removing water from boiler room pits, pipe tunnels, elevator pits, cellars, basements. It is also widely used for transfer service where automatic control of liquid levels in vats or tanks is required.

CAPACITIES Fig. 3047 is available in four sizes for pit depths from 3 to 20 feet. Capacities from 10 to 650 G.P.M. with heads up to 130 feet depending upon capacity.

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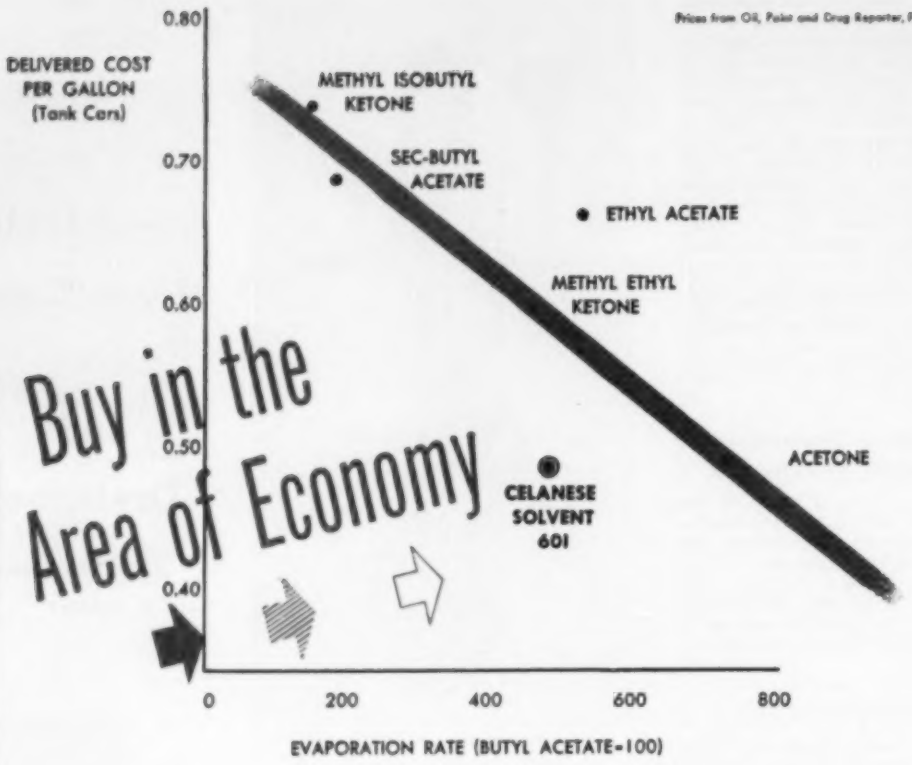

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The course of study, Dean Kenneth K. Condit of the Princeton School of Engineering explains, was incorporated in the Engineering School's curriculum at the start of the last fall term and was developed initially for the undergraduate years through the cooperation of the Departments of Chemical Engineering and Biology.

Altogether, for a selected number of exceptionally capable students, it includes three and a half years of chemical engineering course studies, three years of biology, three years of chemistry and two of mathematics. Approximately one-quarter of the student's time is devoted to courses in the social sciences and the humanities.

The program is expressly designed to provide an educational background for entry into biological industry or into graduate studies. In the food industries, in pharmaceutical and antibiotics manufacture and in other types of manufacture in which biological changes are factors, there is a marked need, Dean Condit says, for men combining knowledge of the basic sciences and of engineering science as represented by chemical engineering.

No separate branch of biological engineering has been established for the program, inasmuch as it constitutes one division of the ten-year old Engineering Science Program that has heretofore presented similar special courses of study in chemistry and physics of a type not ordinarily available in the conventional branches of engineering.

Although the new program is now restricted to basic courses on the undergraduate level, it is anticipated that after a period of orientation, the studies will be extended into the graduate years. As an initial step in this direction, one graduate student with experience in the field of applied microbiology is now matriculated in the program as a candidate for the Ph.D. degree.

Drilling Methods Improved For Exploring Phosphate Beds

Improved methods of diamond-drilling in phosphate-bearing beds in southeastern Idaho and southwestern Wyoming have resulted in greater core or sample recovery, according to the Bureau of Mines.

Using more efficient drilling practices and tools, the bureau recovered an average of 82 percent of the core from the 11 holes drilled in the phosphate beds. From this improved core recovery—from 20 to 50 percent greater than standard drilling in the

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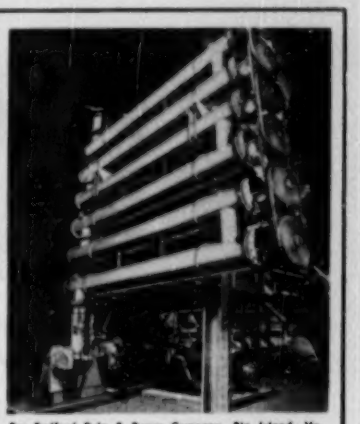
Planning a new plant?



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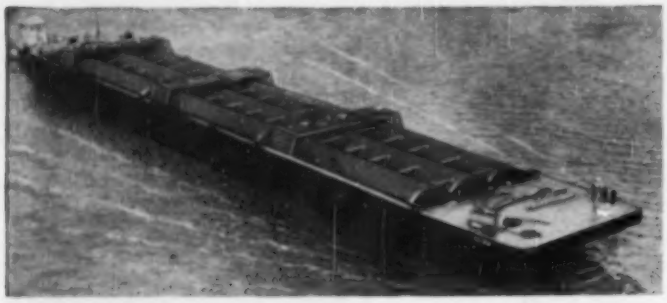

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past—beds in the area most suitable for mining and processing can now be determined more accurately.

The project was conducted by the bureau in cooperation with the U. S. Geological Survey. Experimental drilling was done in Bear Lake, Caribou and Bingham Counties in southeastern Idaho and at Leefe in Lincoln County, Wyoming.

A truck-mounted, gasoline-powered drill on a 36-ft. steel mast—commonly known as a seismograph drill—was used. Modifications were made in the standard drill head by the addition of pressure gages attached to hydraulic-feed cylinders and by relocation of the water pressure gage.

Innovations in the core barrel, bits and drilling practices were made. Detailed drill-hole information was secured, as well as figures on drilling and other costs.

New Chemical Engineering Department at New Hampshire

Creation of a Department of Chemical Engineering, described as a significant step in aiding New Hampshire industry, is announced by the University of New Hampshire.

Dean Lauren E. Seeley of the College of Technology says the new department is a response to the needs of New Hampshire, where a recent survey showed the importance of chemical engineering in industry's development.

The new department will be headed by Oswald T. Zimmerman, professor of chemical engineering, who has been teaching the subject in the Department of Chemistry. An authority on synthetic resins and hydraulic cements, Dr. Zimmerman has been at the University since 1938.

Effective next fall, the new department will have its laboratories in the $1 million engineering building that is nearing completion. Although chemical engineering has been taught for a number of years, laboratory equipment has been limited because of a lack of space in the main chemistry building, James Hall.

About one-half of the 150 students currently majoring in the field of chemistry are enrolled in chemical engineering. Chemical engineering students take general chemistry courses for the first two years and during the junior and senior years specialize in unit operations, chemical plant design, and chemical engineering thermodynamics.

When the chemical engineering laboratories move out of James Hall, the

Department of Chemistry, under the chairmanship of Dr. Harold A. Iddles, will expand into the vacated quarters.

Dr. Zimmerman was graduated from the University of Michigan in 1929. He received his Master's degree in chemical engineering from Michigan in 1931, and a Ph. D. in 1934. He has taught at the University of North Dakota and has been a research chemist for a Detroit dental manufacturing company.

He is a member of the American Institute of Chemical Engineers, the American Chemical Society, and the Society for the Promotion of Engineering Education.

Commercial Solvents Builds New Insecticide Plant

A new insecticide plant for the large-scale production of Lindane, the pure gamma isomer of benzene hexachloride, is to be constructed at Terre Haute, Ind., by Commercial Solvents Corp.

The Lindane production unit will be located adjacent to the present benzene hexachloride plant and will utilize the latter's production of technical-grade material for the extraction of the gamma isomer. The present plant is to be expanded to effect an estimated increase in production of 25 percent. This will permit the continued marketing of the technical product. The insecticide projects are estimated to cost about $500,000.

Expansion of the present benzene hexachloride plant will be completed within six months, while large-scale production of Lindane will be under way within a year.

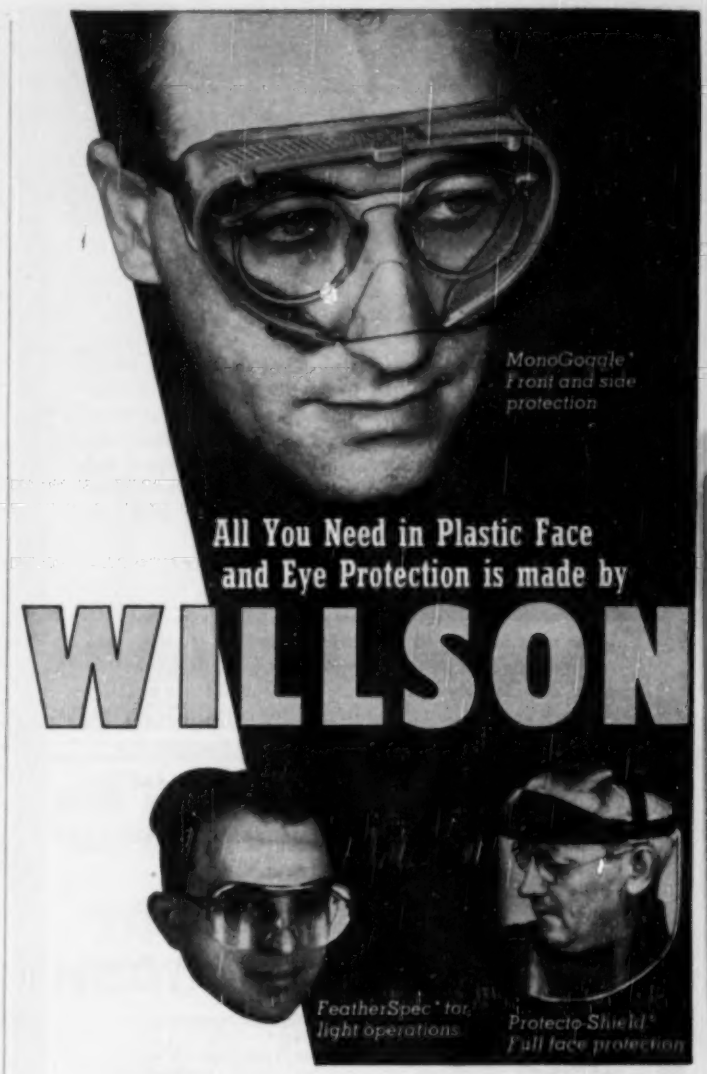
Ion Exchange One Weapon In Battle to Save Water

Can ion exchange help solve water shortages such as New York's? Dow Chemical's Donald K. Ballman replies that, while ion exchange cannot supply new water, such shortages in the future may be eased by the re-use through chemical purification of existing water reserves.

With present day water purification methods, including ion exchange, it is often possible to purify and re-use many types of waste water that are being dumped into the ocean, Ballman says. As an example, he points to industries that discard waste water which could be recycled if given proper treatment.

Ion exchange has been used to recover heavy metals from waste water, Ballman says, often in such manner that the recovered impurities became

(Continued)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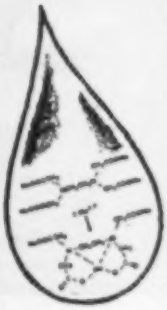
Is the tetra sodium salt of Ethylene diamine tetra acetic acid and is available in solution or powdered form. Extremely versatile, economical and efficient, it may be used to do a variety of things such as:



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VERSENE* is a pale, clear, straw-colored aqueous solution with *total solids* approximating 34%. It has an approximate *density* of 1.2 and an approximate pH of 11.75 in a 1% solution. VERSENE* is also available in crystalline form as a dry white powder. Send for Technical Bulletin No. 1. Ask for Fe-3 Data Sheet. Samples on request.

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salable products. Ion exchange also shows promise for the removal and recovery from many industrial processes of such soluble organic wastes as phenol, mercaptans and acetic acid. Dow ion exchange resins are currently being used in Palestine to make salty water suitable for drinking. Ballman recalls that Dow water engineers and research chemists have been active in the development of new methods for removing silica and other salts that cause scale and other objectionable deposits in steam systems.

W. C. Bauman, assistant director of the company's physical research laboratories, states that during the war a device combining the principles of ion exchange and precipitation was used by the armed forces for the emergency conversion of sea water into safe drinking water.

While the device demonstrated that sea water could be reclaimed, the cost of large-scale purification of sea water for any use makes the process commercially out of reach at this time.

Ion exchange has been successfully used, according to Bauman, to purify ground water that has been contaminated by sodium chloride, magnesium chloride or magnesium sulphate.

Both Dow officials emphasize that an original water source must first be established and that purification can help only in terms of improving the natural water quality and making existing supplies go further by re-use.

Methanol Unit at Texas City Boosts Carbide's Capacity

A new methanol production unit is now in operation at the Texas City, Tex., plant of Carbide & Carbon Chemicals Division, Union Carbide & Carbon Corp.

Addition of these facilities is part of the company's long-range expansion program. The new unit more than doubles the combined methanol production of the company's Niagara Falls, N. Y., and South Charleston, W. Va., plants.

Sohio Boosting Output of Cat Cracker at Cleveland

Plans for a $4.5 million expansion of catalytic cracking facilities at its Cleveland No. 1 refinery have been announced by the Standard Oil Co. (Ohio).

It is anticipated that the expanded facilities will be in operation within 13 months.

The present catalytic cracking unit at Cleveland No. 1 refinery was built

in 1944 to produce aviation gasoline, then essential to wartime needs, and has a capacity of approximately 12,000 bbl. of feed stock per day.

Expansion of this unit will provide capacity within the range of 18,000 to 22,000 bbl. of feed stock per day.

Construction plans are now being prepared by Sohio's engineers.

The expansion of the Cleveland refinery is part of a $100 million three-year program of Sohio to provide more petroleum products for the people of Ohio.

Cat Cracker at Tide Water's Oklahoma Refinery Due In

Expected to start operation March 1, Tide Water Associated Oil Co.'s new Houdriflow catalytic refining unit is nearing completion at the Drumright, Okla., refinery. Over $1 million is expected to be spent by the company in its program to expand and modernize its midcontinent refining operations at Drumright. The cat cracker will process 4,000 bbl. of fresh gas oil daily.

Coker Expanded to Combat Dip in Fuel Oil Demand

A newly expanded refinery unit that will turn more surplus heavy fuel oil into other petroleum products in greater demand has just gone on stream at General Petroleum's Torrance, Calif., refinery.

The coker unit has been added to at a cost of $2.25 million. The expansion project, begun last July, was recently completed. The original unit was taken off stream for maintenance work and to be tied into the new addition.

Working together, the original unit of four coke drums, each 80 ft. high and 17 ft. in diameter, and the two drums just added, will turn about 22,000 bbl. (each 42 gal.) of heavy fuel oil each day into gasoline, gas oil and petroleum gases suitable for use as bottled gas, dry gas and coke.

The coke—over 800 tons daily—is used in the aluminum reduction industry for electrodes. It is also useful as a fuel. In fact, it has as much heat value as the fuel oil from which it is made on a pound-for-pound basis.

Expansion of the Torrance coker facilities, already the largest in the world, represents the best available answer to a problem that has been plaguing California oil refiners for the last 18 months.

The problem is: what to do with heavy fuel oil, now available in quantities far in excess of demand? Three factors have contributed to the prob-

(Continued)

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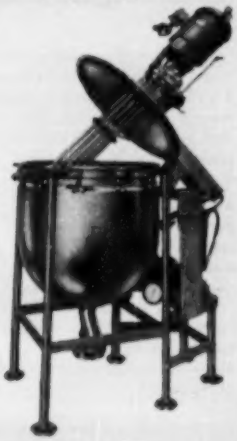

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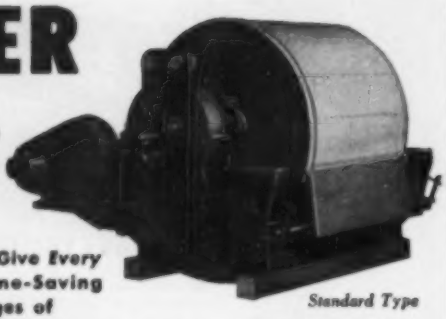

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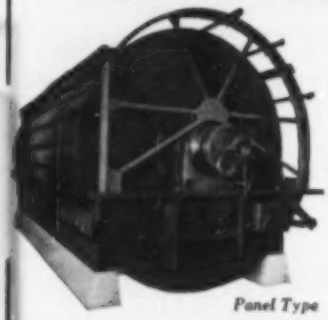

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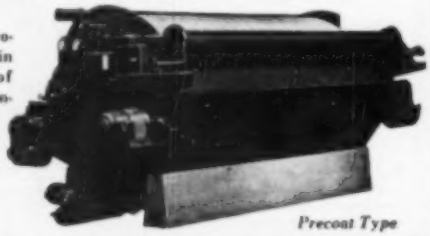

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lem: (1) the switching of railroads to diesel engines away from steam engines, which burn heavy fuel oil; (2) the importation via pipelines of Texas natural gas, which has replaced heavy fuel oil for many uses; and (3) the loss of the Orient export market for heavy fuel oil.

Since all three factors appear to be permanent and since production of heavy fuel oil cannot be significantly reduced as long as demand remains high for other products with which it is mixed in crude oil, a change in processing seemed to be the only answer.

General Petroleum engineers calculate that the new facility will bring the refinery's product yield pattern into approximate correlation with market demand.

The expansion project was designed by the M. W. Kellogg Co. Construction was handled by the Bechtel Co.

Koppers Contracts to Build Byproduct Coking Facilities

Weirton Steel Co. has awarded Koppers Co. the contract for construction of a new battery of 61 underjet coke ovens and for alterations and extensions on the byproduct and benzol plants at the Weirton, W. Va., plant. The projects are to be completed this year.

The new battery of coke ovens is to be arranged for under-firing with blast furnace gas. The ovens will have self-sealing doors. They will carbonize about 1,500 tons of coal a day.

Alterations on the byproduct and benzene plants include installation of additional booster, exhauster and primary cooler units, as well as new light-oil recovery and refining facilities.

Freeport Liberalizes Its Employee Benefit Program

Its employee benefit program has been liberalized by Freeport Sulphur Co. to make the minimum pension $150 a month, with social security included. This provides for employees who retire at 65 after 30 or more years of company service.

Employees who already have retired at age 65 are likewise covered by Freeport's liberalized program.

It's a contributory plan, with employees paying part of the cost, which is computed by a formula based on earnings and length of service. Other features: increased coverage under a group life insurance plan; bigger benefit payments to employees injured on the job; a 50 percent cut in employee

contributions to the firm's accident and health insurance plan; and an increase in the vacation schedule.

Process Yields More Sugar While Consuming Less Water

Development of a new process of waste treatment that promises to make an important improvement in the efficiency of beet sugar manufacture is revealed by Massachusetts Institute of Technology.

The process, now in use in two sugar beet plants in Ohio and one in Michigan, has the combined advantage of increasing sugar yield and eliminating an important source of stream pollution, according to Clair N. Sawyer, associate professor of sanitary chemistry at MIT.

Developed at MIT under Sawyer's direction by E. A. Pearson, now of the University of California, the new waste treatment increases the yield of sugar from every ton of beets by about four pounds while reducing water consumption by at least 320 gal.

If adopted by all the nation's sugar beet mills to which it is applicable, Sawyer estimates, the new process could save more than 20,000 tons of sugar a year and eliminate a source of pollution that annually involves about 3 billion gallons of waste water. This is equivalent to increasing the nation's sugar supply by the amount normally produced from 9,000 acres of sugar beets.

In the conventional beet sugar process, 300 to 500 gal. of waste water are accumulated for every ton of beets. This process waste water contains bacteria and organic material subject to odorous decay, and it is therefore a most objectionable waste product.

Daily volume of such waste from an average mill under conventional operations during the processing season is 300,000 to 1,000,000 gal. Disposal of this waste without endangering health and water supplies is often a tough problem.

Under the new method developed in the laboratories of the MIT department of civil and sanitary engineering, a small amount of chlorine is dissolved in the mill's process waste water. This chlorine destroys bacteria and acts chemically to make possible rapid separation of the non-sugar impurities. The small concentration of valuable sugar that remains in the water can then be recovered, since the chlorine-treated water may be re-used for sugar extraction instead of being discharged as waste.

Thus the new process both captures the sugar left behind in the water and reduces by about 30 percent the

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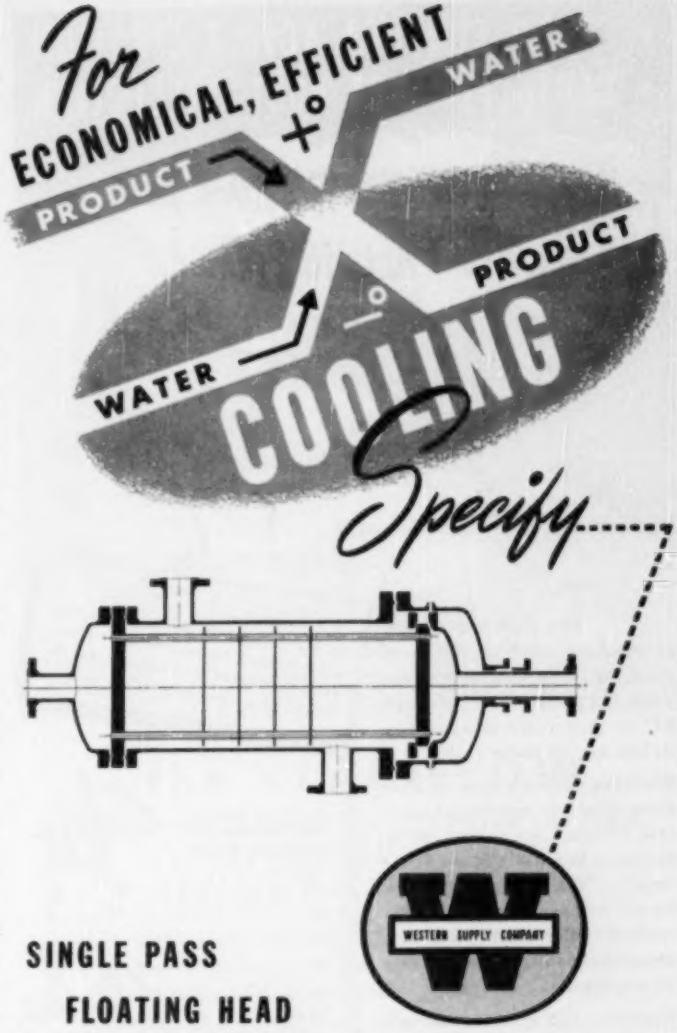

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amount of fresh water required at the mill. It promises to become an important aid in protecting and conserving water supplies in sugar beet areas.

Preliminary economic studies indicate, according to Sawyer, that savings during the first year of operation should be sufficient to pay the cost of the necessary new treating equipment.

All Four Pot Lines to Run At Huge Jones Mills Plant

First capacity operation of Reynolds Metals Co.'s Jones Mills, Ark., aluminum reduction plant since the war will occur late this month.

The plant has four pot lines, each with a capacity for producing 36 million pounds of aluminum annually. This gives the plant a yearly capacity of 144 million pounds of aluminum.

When Reynolds leased the plant from the government in 1946, it was only possible to start up two of the four pot lines there because of lack of economical electric power. The plant includes 68 large engine-generator sets capable of supplying 78,000 kw. of electric power, enough to operate only two of the four pot lines.

In April 1949, the third pot line was started up by using electric power supplied by the Arkansas Power & Light Co. But in August, a strike closed down the plant, which was not put back in operation till late in September. At that time, only two of the four lines were started up.

However, electric power will soon become available from the new Lake Catherine power plant, now nearing completion, under a long-term contract with the Arkansas Power & Light Co. Accordingly, Reynolds started up the third pot line in February and plans to re-open the fourth this month.

Erection of Newsprint Mill Sets Construction Record

Emergence of the first sheet of newsprint from the new mill of the Coosa River Newsprint Co. three months ahead of schedule marked a construction record in the pulp and paper industry. It had been only 21 months previous that the mill's constructors, Daniel-McGraw—a combine of F. H. McGraw & Co. and Daniel Construction Co.—officially broke ground on the huge Alabama project.

"The long experience record of the two companies, especially in the pulp

and paper industry, and the coordination of the two construction teams accounted for the early completion of the project," Donald W. Neville, McGraw vice president, states. Both firms assigned their top construction engineers and superintendents to the project. Under the guidance of J. E. Sirrine Co., the plant's engineers, and Kimberly-Clark Corp., they were able to erect the mill with a maximum of efficiency. J. W. Rice of Daniel was superintendent of general construction and J. M. Curlee of F. H. McGraw was superintendent of mechanical erection.

In August 1948, nearly 500 men were employed on the construction of the mill. This figure varied during various phases of construction. Cost of materials and equipment in the plant is estimated at nearly $20 million.

In addition to the main structure of the gigantic plant, which is 1,100 ft. long and nearly 250 ft. wide and houses 300-ft. long machines, Daniel-McGraw constructed a lime kiln, a slaker building, wood room, salt cake storehouse, chip bin, recovery building and evaporators, and a main office building. The Coosa River newsprint mill was one of the largest construction projects undertaken in the South since the war.

The new $32 million newsprint mill, operated by Kimberly-Clark Corp., is designed to turn out 300 tons daily at peak production. Contracts for purchase of its products have been signed by executives of 119 newspapers. Stock in the Coosa River Newsprint Co. is held by 128 newspapers throughout the United States.

Located 40 miles southeast of Birmingham, the newsprint plant is on part of what was once the huge Childersburg Ordnance Works. A 40-year lease has been taken on an $8 million power plant at the Ordnance Works and a lease on the water filter plant.

New Furnace Will Triple Perlite Popping Capacity

A $100,000 modernization program, including installation of conveyor systems, bins, and an additional furnace to process the lightweight aggregate perlite, will be undertaken by the Perlite Manufacturing Co., of Carnegie, Pa., T. C. Ward, president, announces. Improvements will triple the company's production capacity.

The new furnace will enable the plant to process two tons per hour of raw perlite, a volcanic rock, into the finished product used in plaster and other building materials. Daily

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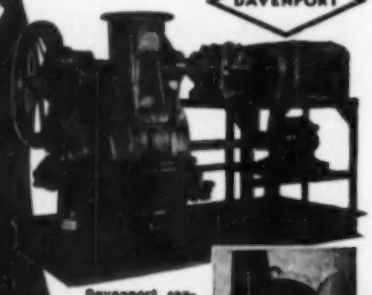
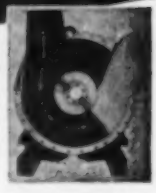


Davenport continuous press equipped with variable motor drive



Cross section of press

Davenport rotary dryers available in steam tube, direct fired and hot air models.

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production capacity will be raised to 3,600 4-cu.-ft. bags, enough to cover 40,000 sq. yd. of wall surface as a plaster aggregate.

Large volume demand for the firm's products by contractors in the Pittsburgh area makes necessary the production expansion, scheduled for completion early in 1950, Ward says. The Perlite Manufacturing Co. began operations at its Carnegie plant in 1943

Plant Protection Pays Off As Fire Damages Plummet

A new low in occurrence and severity of fires was established during 1949 at its Cincinnati plant by Hilton-Davis Chemical Co.

Chester H. Allen, safety director, looks back with pride upon 1949, a year in which only three fires caused damage enough to require the filing of claims, which totaled $3,300. Better than any past year since this Sterling Drug division has grown to its present size of 22 buildings on 80 acres, the record is considered unusually good for a plant working constantly with many solvents and chemicals.

Harry Hughes is safety inspector at the Hilton-Davis plant and chief of the volunteer firemen, numbering 42 employees covering three shifts.

All buildings are provided with automatic sprinklers, with both wet and dry systems. Forty-five portable extinguishers, either the carbon dioxide or dry powder type, are strategically spotted. Eleven fire houses on the plant site are equipped with hose, fire tools and a selection of nozzles. Many are spray nozzles, delivering either a solid stream or a regulated water spray. The water spray, according to Allen, is particularly useful in fighting oil or solvent fires. It greatly reduces water damage. Throughout the 22 buildings in many locations 1-in. hand hoses are also ready for immediate use in emergencies. Four of these are equipped with spray nozzles.

The plant has been divided into four numbered fire areas. Thirty-five fire alarm boxes are connected by the American District Telegraph Co. to the Cincinnati fire department. ADT immediately gives the location of the fire to the plant's boiler room. The fire whistle then blows the alarm, telling where the fire is. The alarms are tested regularly, and the volunteer brigade is frequently assembled for drills.

Newest fire-fighting equipment now being installed is an especially designed carbon dioxide flooding system pro-

tecting a new Dowtherm heating unit in the varnish plant. In this plant large kettles are all protected by permanently piped cylinders so arranged that, if a fire starts, they can be flooded instantly with carbon dioxide. The new equipment brings to five the total number of this type of protection in the varnish building. Additional protection is provided by five hose lines, four equipped with spray nozzles.

Briefs . . .

Chromic acid production facilities at the Newark, N. J., plant of Better Finishes & Coatings, Inc., are said to be the first new ones installed in the U.S. in years. Technical-grade flaked chromic acid is now being produced in new electrochemical equipment at the plant. Chromic acid production is the first in a series of steps being taken by Better Finishes & Coatings to expand its line of products for the organic finishes, electroplating and metal working industries.

Burkart-Schier Chemical Co., Chattanooga, Tenn., now sponsors a weekly radio program over Station WDOD, Chattanooga, featuring the role of chemistry in textile development. The program, in which no company promotion or advertising is presented, is highly interesting, with a great deal of historic information.

Allied's Barrett Division now has a new asphalt tile laboratory at its Edgewater, N. J., applications research laboratories. With mills and other equipment, as well as facilities for physical testing, the laboratory will concentrate on development and improvement of Barrett materials and their application in asphalt tile products. Its staff stands ready to help asphalt tile manufacturers, whether or not they are users of Barrett raw materials, in solving manufacturing and testing problems.

American Bitumulus Co. plans to convert and expand its newly acquired refinery at Mobile, Ala., to produce all grades of paving asphalts. This Standard Oil Co. of California subsidiary bought the refinery from Coastal Petroleum Corp. of Mobile for $700,000. The plant will be in operation early in April. —End

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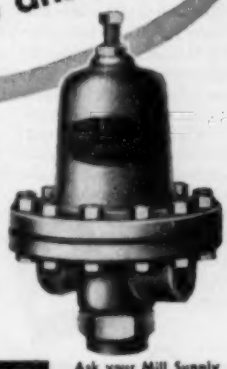

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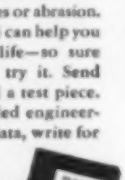

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READERS' VIEWS AND COMMENTS

Slip-Up

To the Editor:

Sir:—Some time ago we sent you a short news item on a rather unusual installation of one of our boilers in which the steam generated is a by-product and the principal function of the boiler is to produce CO_2 for use in the manufacture of dry ice. This installation has been in service now for nearly a year in the Chicago plant of Pure Carbonic, Inc. The article contained performance data attesting to its very successful operation.

You regarded it as sufficiently interesting to use almost in its entirety in your December issue. In fact, the only part of it that you omitted was the identification of the boiler as a product of Combustion Engineering-Superheater, Inc. This identification was certainly a valid part of the news story. We feel its omission was unfair to us and if there is some way in which you can bring this omission to the attention of your readers, we shall appreciate it.

CHARLES MCDONOUGH
Combustion Engineering-Superheater, Inc.
New York

Thermodynamic Properties of Superheated Chlorine

To the Editor:

Sir:—In his paper "Thermodynamic Properties of Superheated Chlorine," p. 118 of the November issue of *Chemical Engineering*, R. E. Hulme has in Table II given data, of which many are incompatible with the fundamental laws of thermodynamics. According to these laws we have at constant pressure:

$$h_2 - h_1 = \int_{S_1}^{S_2} T\,dS = T_m(S_2 - S_1)$$

where the temperature T_m, defined by this equation, must lie between the values T_1 and T_2, the integrand T being a monotone function of S. However, the tabulated values corresponding to 280 psia., 150 deg. F. (609.58 deg. R.) and 200 deg. F. (659.58 deg. R.) respectively, give

$$T_m = \frac{h_2 - h_1}{S_2 - S_1} = \frac{(247.55 - 238.85)}{(0.6814 - 0.6710)} \cong 836 \text{ deg. R.}$$

a value, far from lying between 609.58 and 659.58 deg. R. The values corresponding to 280 psia., 300 deg. F. (759.58 deg. R.) and 400 deg. F. (859.58 deg. R.) respectively, give in the same way a value $T_m = 678$ deg. R., not being in the interval between 759.58 and 859.58 deg. R. The values corresponding to 20 psia., 150 deg. F. (609.58 deg. R.) and 200 deg. F. (659.58 deg. R.) respectively, give $T_m = 708$ deg. R., not being in the interval between 609.58 and 659.58 deg. R. Many other examples could be given.

Using the enthalpy—temperature diagram given by the same Hulme and Tillman in *Chem. Eng.*, Jan., 1949, pp. 102-103, and the equation

$$S = S_o + \int_{h_o}^{h} \frac{dh}{T}, \text{ at constant pressure}$$

it could have been possible to calculate entropies of saturated and superheated chlorine at least being compatible with fundamental laws of thermodynamics. The Table II (Nov. issue, p. 119) and the enthalpy—temperature diagram (Jan. issue pp. 102-103) are thus not consistent.

JARL SALIN
Faculty of Chemical Engineering
Abo Akademi
Abo, Finland

It's a Yardstick, Not a Micrometer

To the Editor:

Sir:—Prof. Jarl Salin of Abo Academy in Finland is, of course, correct in his statement that the entropy values in Table II of my article should be consistent, thermodynamically speaking, with the enthalpy values. The fact that they are not is greatly regretted by the author. However, in all fairness it should be pointed out that the test applied by Prof. Salin is a rigorous one in that he is dealing with differences between numbers whose absolute values were not claimed to be of the accuracy implied. For example, a change of only ½ of 1 percent in the magnitude of either one of the entropy values, in the first example cited, would result in a satisfactory (630 deg. R.) mean temperature. When it is remembered that Eastman's heat capacity equation is the basis of the whole enthalpy grid, for which Eastman claimed an accuracy not much greater than 5 percent, to attempt to claim greater accuracy is a fallacy.

The curves and tables were prepared

primarily for the use of engineers and, as specifically stated in the article, only engineering accuracy was claimed. We also stated the information was intended to serve only until some one of our contemporaries should supply us with accurate PVT data, there being no data at present. If Prof. Salin's comments lead someone to determine the missing data he will have rendered a great service.

To get a better picture of the problem as a whole, let us relate how the data were determined. As was stated in the articles, the calculated values were plotted and then smoothed, the final figures being read from the smoothed curves. The calculated values for both the entropy and the enthalpy were derived from the same basic pressure-volume extrapolation and were plotted against the same variable, temperature. Hence, we may assume that the discrepancy is due to the smoothing operation. Actually, the calculated entropy values readily gave smooth curves, but the calculated enthalpy values did not. Some calculated enthalpy values were off the curve as much as 3 or 4 Btu. which was the reason for smoothing the data.

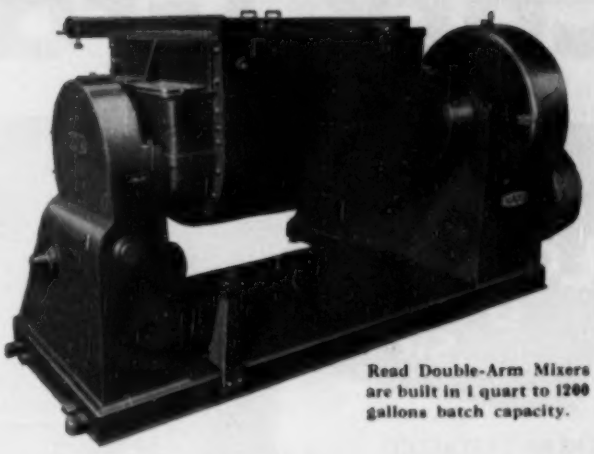
The question of calculating the entropy from the enthalpy poses a question of a choice of thermodynamic consistency with the enthalpy or an independently calculated value which should be consistent with the volume data. It is almost impossible to redraw a graph such as Fig. 4 (the enthalpy curve in the first article) and have it agree precisely with the original. Such is the case with the printed version of this curve. For the reproduction scale used, the width of one of the constant pressure lines would correspond to roughly a change of 25 lb. in pressure. Hence, the use of the enthalpy approach did not appeal to the author, particularly since we were none too sure of precisely where the constant pressure lines belonged. However, for most engineering calculations ½ or even 1 Btu., one way or the other makes little practical difference in the usual calculations involving enthalpy. Likewise, better agreement of entropy with volume data is taken at the sacrifice of thermodynamic consistency.

R. E. HULME
Diamond Alkali Co.
Cleveland, Ohio

Corrections

There are two changes which you should make in your February issue. (1) In the first column of p. 133 is an equation for r. It should be $r = \frac{1}{4}He^{\theta=0}$. (2) On p. 135, the investment in Calco's boiler house was $2 million, not $20 million. —*End*

MIXING CYCLE *Speeded Up*
PEAK LOADS MINIMIZED



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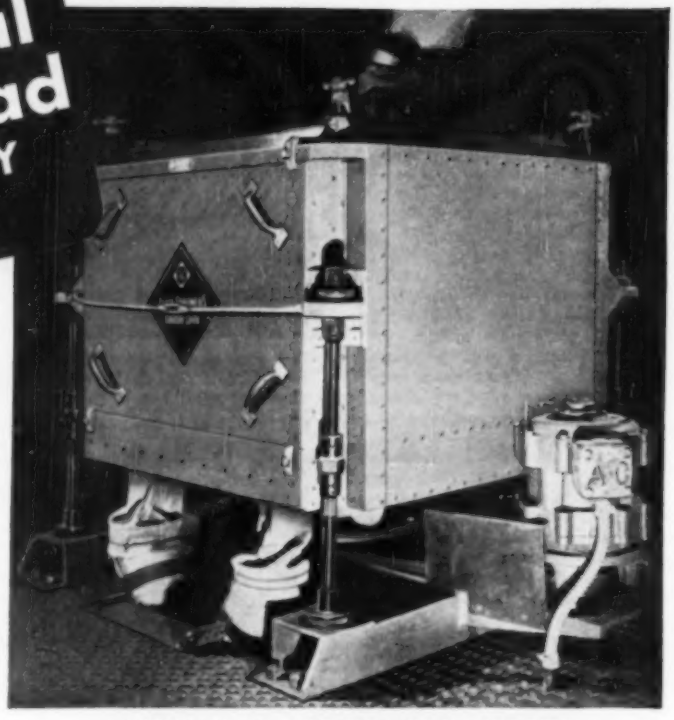

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In a large Pennsylvania cork products company.

★ **HOW USED**
For grading and sifting of ground cork — used by tobacco companies to cork-tip ends of cigarettes.

★ **CAPACITY OF MACHINE**
This *Low-Head* gyratory sifter handles 200-250 lb per hour, 16 hours a day.

★ **REPORT ON OPERATION**
"Machine is very simple and above normal mechanically. Was installed six months ago and only maintenance so far has been routine greasing."

NEW A-C SIFTER HAS MANY CHEMICAL INDUSTRY APPLICATIONS

YES — THIS NEW all-metal *Low-Head* sifter is doing an excellent grading and sifting job for this cork products company . . . but that's only one of many applications for this versatile Allis-Chalmers machine.

It's ideally suited for *chemical processing* jobs because it is an *all-metal* unit. Made of steel and magnesium, the sifter handles high temperature materials safely. And it can be cleaned by *washing* with hot or cold water—without danger of warping. Sieve screens can be silk or metal, as preferred.

The *all-metal Low-Head* sifter is a high-speed, high-capacity unit holding four to seven sieves. It is similar in functional design to the *standard* A-C gyratory sifter used for years by food and chemical processors.

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Men, Machines and Methods

ROGER WILLIAMS, Jr., Associate Editor

J. G. Munson

Cerro Bolivar

His Faith Will Move a Mountain

Until a few months ago, Bucks County, Pa., was a quiet area of rolling hills—some farmed, some woodland. A suburban area to Philadelphia —and New York too—it has been noted for the artists, playwrights, and the city businessmen who owned farms in the area. "Gentlemen farmers" dot the county—men like George Kaufman, Moss Hart, Harry Haenigsen (the comic strip "Penny"), Theron Bamberger and his Bucks County Playhouse, Jon Gnagy (the television artist).

Normally, a quiet descends on Bucks County in the winter. The artists and businessmen stick to the big city, or head south to warmer climes. The real estate men sit back and relax—looking forward to the spring. The antique dealers do their refinishing and sell through city outlets.

But not this winter! Not since the news broke—a couple of months ago —that U. S. Steel had bought 3,800 acres of land right in the middle of Bucks County—at Morrisville, just across the river from Trenton. Big Steel hasn't announced its plans in detail—but Morrisville is going to have the biggest, completely integrated steel mill on the East Coast. The chemical industry knows what that means—a new source of chemicals, byproducts from steelmaking. So expect to see new chemical plants rising in Bucks County, based on those byproducts.

But more about that later.

What has happened in Bucks County is a good example of what happens, on a smaller scale, whenever a plant is planned that will bulk large in the manufacturing of an area.

Real estate has been the first thing to boom—commercial real estate, that is. A rise in housing prices has not yet started.

In New Hope, the art colony of the county, one building was on the market for $17,000 when the Big Steel news came. It was withdrawn from the market fast, and the owner has since refused $38,000 for it. A little tiny store building, that probably did not cost more than $3,000 is for sale at $10,000.

Private mortgage money is freely available, too—the lenders hoping to pick up property later by foreclosure. The recorder's office in the county seat of Doylestown is busier than any winter in years. A goodly number of the tanning "gentlemen farmers" have headed north, too.

The reason for all this activity stretches all the way from Minnesota to Labrador to Venezuela. Behind it is a huge gamble, with high odds—yet one that paid off.

Ahead? Well, U. S. Steel hasn't given out the details, or the timing, but here is what one expert predicts.*

Before 1955, Bucks County will have a 2 million annual ton steel plant—operating on Venezuela ore. It will have three blast furnaces, two openhearth shops of eight 150-ton furnaces each. There will be one hot and one cold continuous mills, a wire mill, and pipe and bar mills. "The whole thing would certainly be a long, level, straight-line affair, from blast furnaces to shipping dock, quite possibly the most beautfully designed integrated mill in the world."

The history of this disruption of Bucks County's normal hibernation began in 1945. U. S. Steel's vice president John G. Munson, young in thought and outlook for his 65 years, knew as well as anyone that the famous Mesabi range ore was running out. In charge of Big Steel's raw materials, Munson was worried. He had to recommend the future course—which could lead to use of low grade Taconite ore, or to a radically new ore source.

Taconite, from Minnesota, could be used all right. But the expense was staggering.

A new ore source? USS had files full of field reports, the results of more than 35 years of searching. Was there any sense looking any more? Munson's answer: "Yes." It was a gamble with high odds, but Munson took it.

By the end of 1946 nothing big enough had been found. Then another gamble was taken. There was one area of Venezuela that had not been too completely explored for iron—the area south of the Orinoco River and west of the Rio Caroni. The Venezuelan government didn't think there was iron there; neither did M. A. Hanna Co. or Bethlehem Steel, both of which had looked hard at Venezuela.

Early in 1947 the area was photographed by plane and a few likely spots picked for more study. One was a mountain called La Parida (now renamed Cerro Bolivar). In April the first field party reached the mountain —and got the highest magnetometer readings ever recorded. AIME's Lippert puts it, "Over half of La Parida is solid iron ore of almost unbelievable purity—by all sober estimate the richest and greatest iron deposit in the history of the world!"

Since the find, Big Steel has been busy with plans for getting the ore out. Conveyors will bring the ore down the mountain. Railroads will carry it to the loading port. Huge 45,000-ton ore boats will bring it to the U. S. A. The boats may be able to dock directly at the foot of Big Steel's Morrisville plant—if the Army goes through with its project for dredging the Delaware River from Philadelphia to Trenton.

(*Continued*)

* T. W. Lippert, manager of publications of the AIME, writing in the February issue of *Journal of Metals and Mining Engineering*. Much of the remainder of this article is drawn from Mr. Lippert's

$9,100 replacement costs

4,732 man-hours overtime

by installing

one acid-proof

TANTALUM Heat Exchanger

Are you paying for high efficiency, long lasting Tantalum equipment you haven't got? It's quite possible. Replacements, repairs, overtime, shutdowns, loss of product may be constantly adding up dollars of loss that would far more than pay for Tantalum equipment that would free you from these troubles.

Take this case in point from actual records! 1937: a ferrous alloy heat exchanger had been replaced on an average of 2½ times a year at a cost of $700.00. This did not include several hundred overtime maintenance hours, nor time in bringing solution to working heat.

An acid-proof Tantalum heat exchanger was installed. 1949: The record shows after more than 12 years of use it had saved $9,100 replacement costs as figured against the old heater. In addition to its trouble-free operation, this Tantalum heat exchanger saves 7 pre-heating hours every working day in each heating, amounting to 4,732 man-hours of overtime.

If you are looking for dollars-and-cents economy and dependable performance, investigate Tantalum. Fansteel Metallurgical Corporation, North Chicago, Illinois.

Use Tantalum with economy for most acid solutions and corrosive gases or vapors except HF, alkalis, or substances containing free SO_3.

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MM&M, *cont. . .*

If Lippert is right that Morrisville will be a 2,000,000 annual ton plant, it will need 3,800,000 tons a year of ore, 800,000 tons of limestone, and 1,800,000 tons of coke. That means better than 300 coke ovens, carbonizing some 2,500,000 tons of coking coal each year.

To the chemical man, Morrisville will mean a source of 25,000,000 gal. yearly of tar, 7,500,000 gal. of refined light oils, and the possibility of 60,000,000 lb. of ammonium sulphate.

Who will use these steel byproducts—new plants or existing ones? The answer is probably both. Although there are chemical plants and petroleum refineries galore along the Delaware River, there are few above Philadelphia. On the west shore of the river, the chemical plants begin above Wilmington—with Du Pont's pigments plant. Marcus Hook has a galaxy of oil refineries, General Chemical, linoleum, others. On the east shore there is Du Pont's huge organic plant at Deepwater Point, N. J. More plants and refineries line the shore clear to Philadelphia. And the river in Philadelphia has its share of chemical plants, paint plants, and the like.

But oddly enough, there are few big chemical plants on the Delaware much above Philadelphia. The big Rohm & Haas plant at Bristol is about the last one. And there is some, not much but some, land available between Bristol and USS's site at Morrisville. With a good cooling water situation, the prospect of ocean shipping, good railroad facilties, and the big eastern markets, there should be more activity in the area.

As you get much above Morrisville, you run out of level land near the river. The rolling hills come closer to the river—and they are practically solid rock. Many are scarred, on both sides of the river, by operating or long-worked-out quarries. And the river changes complexion. Fine for canoes or outboards, but not for commercial traffic.

So it is the area between Philadelphia and Morrisville that may see new chemical plants. Perhaps as Lippert puts it, "When both the Venezuelan ore and the finished steel market in [the Trenton] area are viewed together, it would be expected that by mid-1960 another 'South Chicago' will have sprung up on the flat farmland beyond Trenton."

The old-timers of Doylestown, New Hope, Newtown, Washington's Crossing, Lumberville and the other Bucks County towns hope it won't smell or smoke too much.

—*End*

CLOSE-UP...

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The gears used in Farrel speed reducers have a *backbone* instead of the useless center groove found in some herringbone gears. This *backbone*, formed where the helices meet to make the teeth continuous across the face, gives you a real bonus in power transmission. It puts the entire width of the gear to work, providing greater capacity to withstand shocks, stresses and heavy loads.

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For the full story of the many features of Farrel speed reducers, send for a copy of new Bulletin 449. This 44-page handbook gives simple, easy-to-understand directions for selecting speed reducers of the horsepower and speed you need. It contains specifications, horsepower rating tables, overhung load capacities, dimensions and weights.

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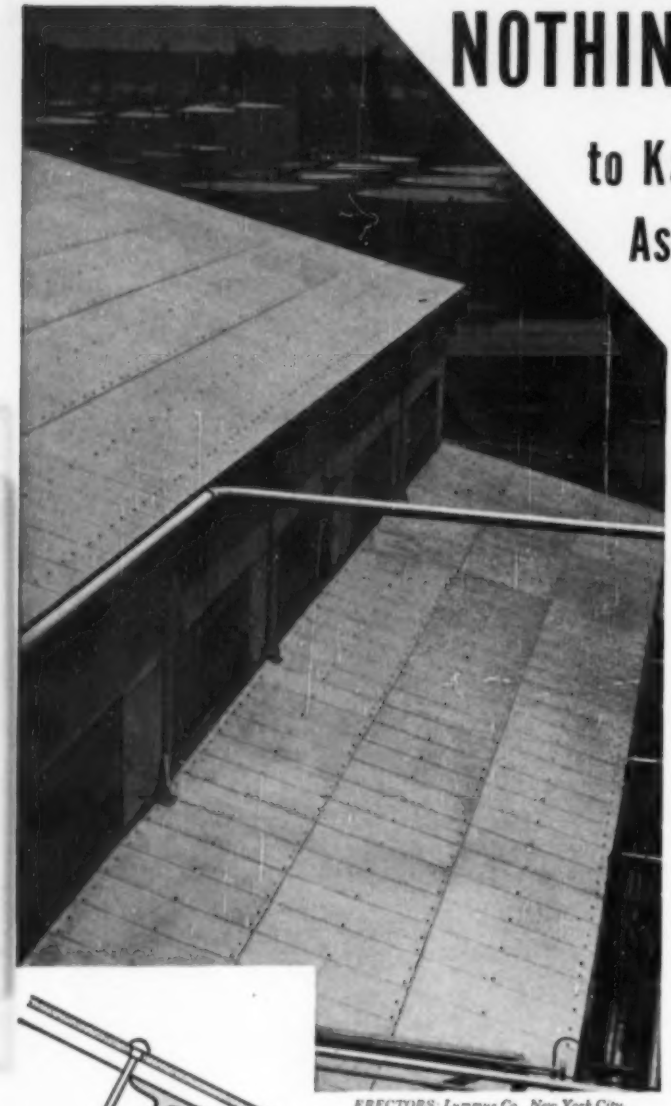


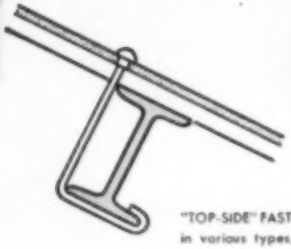
Here you see it used for both the roofing and siding on this Shell Oil Company building at Deer Park, Texas. Don't ever expect to see it hurt by the weather or other adverse atmospheric conditions. Count on it to go rustless and rotless. It won't suffer from rodents and termites, and is exceptionally resistant to fire.

Easily cut and fitted on the job, K&M "Century" Asbestos Corrugated produces tight, good-looking surfaces at minimum labor cost. For extra savings use "TOP-SIDE"* fasteners, as on this Shell building. They entirely eliminate scaffolding and are only available with K&M "Century" Asbestos Corrugated.

Your finished job will benefit by the inherent structural strength of this material which actually gains strength with age. As for upkeep, you needn't figure on even one bit of paint!

*T. H. & B. Enterprise Corp.

ERECTORS: Lummus Co., New York City.



"TOP-SIDE" FASTENERS are made in various types, to fit all steel members on both roofing and siding. Illustration of typical "I" type for roofing.

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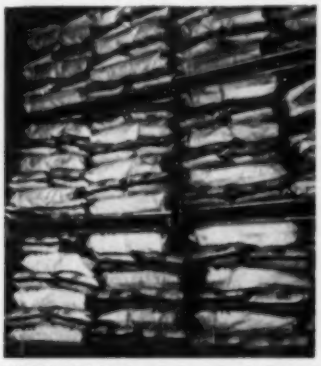
Handling, Packaging and Shipping

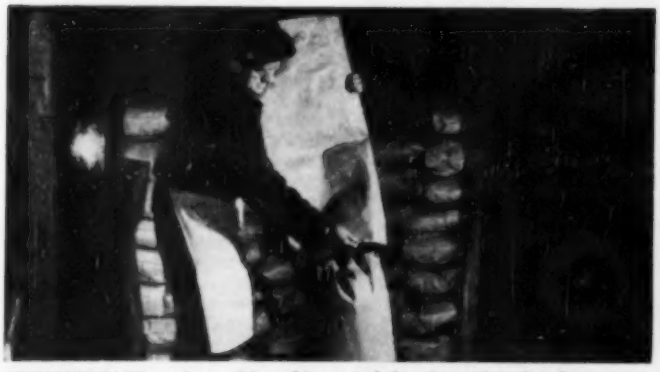
R. W. LAHEY, Editorial Consultant

OUTDOOR STORAGE does not hurt them. These bags were stored outside in New Jersey from December to April. The water soluble salt was not hurt.

PULL STRINGS give fast opening advantages. They step up consumers' savings.



HIGH STACKS are common in store houses. Palletized loads speed handling.



OVERSLIP BAGS cut losses. Many shippers include a few with each order.

Packaging Notebook—III

MULTIWALL BAGS

Multiwall paper shipping sacks have played an increasingly important part in influencing chemical packaging trends in the last 10 years. They are fabricated from the cheapest of packaging materials and have all the advantages of a completely flexible container. Therefore, it is logical that these bags should have attained an important role in transporting chemicals.

These containers, in the early 1920's, were first used for packaging rock products such as cement, plaster, and lime. They were admirably suited to ship these relatively low-cost products—ordinarily transported in large volume over short distances. However, it required more than a decade to adapt these first multiwall sacks into the specialized containers incorporating the protection required by many products of the food and chemical industries. In the 1930's, bag manufacturers, through improvements in the techniques of bag making and with the help of improved raw materials such as adhesives, and better paper as well as coated and laminated papers, made great strides in accomplishing this goal. They were ready at the start of the second World War to perform the packaging feats which were required of them.

Bags containing flour have been floated over Niagara Falls and when one of them was recovered, after the severe drop and the pounding it received while floating around at the bottom of the Falls, it was found that the flour was dry. They have been dropped from airplanes and run over by the wheels of 10-ton trucks and were found to be capable of further shipment. Hundreds of sacks filled with hygroscopic material have been shipped to Scotland and stored out of doors for several months. When the compound was finally used it was found to be in satisfactory condition. These are spectacular stunts, but they

(*Continued*)

COOPER ALLOY

NEWSCAST

PUBLISHED BY THE COOPER ALLOY FOUNDRY CO., HILLSIDE, N. J.

THERE'S GOLD IN CALIFORNIA BUT GOULD IN SENECA FALLS

PUMP PIONEERS ANNOUNCE NEW STAINLESS CENTRIFUGAL UNIT

1849 . . . the famous California Gold Rush was on! One year later Seabury S. Gould had designed and cast the world's first all metal pump at Seneca Falls, N. Y. The Gold Rush is just a memory, but Goulds Pumps, Inc., is the largest pump manufacturing plant in the world.

Their new stainless steel centrifugal pump, Fig. 3705, was created to provide economical handling of a variety of acid and alkaline liquors. Rugged in performance and economical in operation, it was designed to meet the corrosive conditions present in the chemical, process and allied industries. For economy, the fluid end, which is specified in stainless steel, is mounted on cast iron supports. This allows selection of the most suitable high alloy material for all parts in contact with the liquid, while permitting the use of less expensive materials where high corrosion or abrasion resistance is not required. From the viewpoint of maintenance, both suction and discharge connections are located in the stainless casing. Removal of the casing cover permits the pump interior to be inspected or cleaned without disturbing pipe connections.

Built to handle up to 720 gallons per minute with heads up to 200 feet, depending upon capacity, these new centrifugal pumps are ideal for the rigid requirements encountered in the process industries. To provide maximum service under the most exacting conditions, Goulds engineers have specified Cooper Alloy stainless castings for the major components in contact with corrosive media. Quality castings plus top design engineering assure long trouble-free service.

AVAILABLE UPON REQUEST technical data chart giving analyses, comparative alloy designations, properties, and applications of cast stainless, nickel and monel.

The COOPER ALLOY Foundry Co.....leading producer of Stainless Steel VALVES • FITTINGS • CASTINGS

do illustrate the fact that these containers can be constructed to provide protection against the worst climatic conditions. They will take punishment far beyond the abuses of ordinary transportation and storage. They are capable, when properly constructed, of providing adequate protection to the more expensive products. This becomes more apparent when it is understood that multiwall paper shipping sacks are custom made products. There are no such things as standard sizes and constructions which are carried in stock awaiting shipping orders from users. The extreme variations in size requirements as well as the differences in constructions have prevented standardization. Some day these disadvantages may be overcome and the obvious economies of large runs obtained.

These bags are fabricated of three to six plies of kraft paper in tubular form so nested one within the other that each wall carries its proportionate share of the burden. Side seams of tubes are pasted. Waterproof glue is used when specified. Bottoms are closed by pasting or sewing and taping. The multiple construction (in addition to providing extreme flexibility by the use of relatively light-weight kraft paper) allows choice for each ply of a specific sheet which is designed to provide a special type of protection. Bag walls are fabricated of 40 lb. to 70 lb. basis weight paper made to meet requirements of Federal Specification U.S.S. 48.

Ordinarily, the heaviest weight of paper is used as the outer ply as it is most resistant to abrasion, snagging and other abuses of handling and transportation. The 70-lb. sheet is particularly effective when used for this purpose. A highly sized hard finished outer sheet is used in instances where filled bags are handled on gravity chutes to increase slippage. This type finish has a degree of water resistance. Outer plies having a rough finish give better stacking and palletization security. This "non-slip" characteristic is sometimes obtained by using a creped sheet. Creping reduces the strength of the sheet somewhat. It increases the stretch beyond that of the other uncreped plies and thus does not work in as close harmony with the other plies that have not been so treated.

A wide variety of protective sheets can be used to obtain special protective features such as resistance to (1) grease and oil penetration, (2) penetration of water vapor and water, (3) abrasion, etc. (4) alkalis and acids, etc. Some of these specialty sheets are: (1) Asphalt laminated

papers for water and water vapor resistance; (2) asphalt impregnated papers for water and water vapor resistance; (3) waxed papers for water and water vapor resistance; (4) glassine and amorphous wax laminated glassine papers for grease, oil, water and water vapor resistance; (5) polyethylene coated kraft for acid, alkali, water and water vapor resistance; (6) vegetable parchment for resistance to oils and greases; (7) clay coated paper to prevent sticking of some compounds which are cast into the bags such as asphalts, rosin, and resins; (8) wet strength paper provides strength when wet and unusual resistance to scuffing; (9) sisal or string reinforced asphalt laminated papers have exceptional resistance to snagging.

One or more protective sheets of the above types can be incorporated into the bag construction as required. These sheets may be used in whatever position in the bag that they are most effective. For instance, it is often advisable to place the water vapor barrier next to the inside ply. In this position it is unlikely to be damaged in filling or by any abrasive action of the contents. It also will reduce dehydration of the other plies if the product is very hygroscopic. Lumpy materials having sharp edges can often be packed in multiwall sacks having a heavy inside ply such as 70-lb. kraft bag paper.

Bag bottoms are closed by the bag fabricator. They are either pasted or sewed and taped. In most instances the tape is applied first and then sewed. But in some instances tapes are pasted over the sewing and in others there is applied a strip of paper under and tape over the sewing.

The open mouth sacks are closed after filling by sewing, sewing and taping, wire tying or string tying. On the other hand, the valve bag is closed at both top and bottom by the manufacturer. This preclosed sack has a small opening or "valve" in one corner through which it is filled by a special machine. The valve is designed to be self-closing by the pressure exerted by the contents against an inner flap of the valve when it is withdrawn from the filling tube and dropped to the conveyor. With the advent of belt and auger type valve bag packers, valve sizes were increased from 3 in. up to 5¼ in. As it was impossible to prevent excessive sifting from these larger valve openings tuck-in and inner sleeves were used. These sleeves are made from plain kraft, creped, laminated or coated papers. Sewed closures can be protected against trans-

(Continued)

TURN DUST INTO PROFITS*

Hundreds of plants have done it... with Pangborn Dust Control!

* **$13,951**

Pangborn Dust Control eliminates dust, pays for its operation, and *earns $13,951 each year* on charcoal salvage for this manufacturer!†

* **$12,752**

In a large grain mill, Pangborn Dust Control eliminates dust hazards and *earns a profit of $12,752* annually, salvaging grain formerly lost as dust!†

* **$7,691**

Based on operating costs before and after Pangborn Dust Control was installed, savings, other than salvage, for this metal plant *run $7,691 a year!*†

* **$5,103**

Asbestos salvaged to the tune of *$5,103 yearly* . . . dust completely eliminated . . . that's the Pangborn Dust Control profit story for this Asbestos manufacturer!†

HOW ABOUT YOUR PLANT?

Let us make a "Dust Pocket" survey in *your plant*. There's no obligation! Pangborn engineers show you how the right Pangborn Dust Control equipment saves you money . . . boosts your profits! For full information and your *free copy* of Bulletin 909A on the control of industrial dust, write today to: Pangborn Corporation, 283 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning equipment.

THE DUST HOG from stealing profits with

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DUST CONTROL

THERE'S A MONARCH NOZZLE FOR EVERY SPRAY JOB

Remember—if the liquid can be sprayed with direct pressure Monarch can furnish the Nozzles.

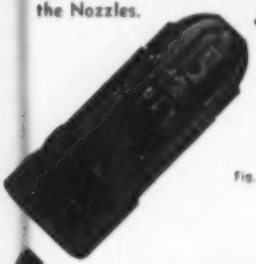


Fig. 980

In many industries Monarch Spray Nozzles are used for:

ACID CHAMBERS
AIR WASHING
CHEMICAL PROCESSING
COOLING PONDS
DESUPERHEATING
GAS SCRUBBING
HUMIDIFYING
OIL BURNERS
SPRAY DRYING

Catalogs 6 A and 6 C Sent on Request

Monarch Mfg. Wks., Inc.
2513 E. ONTARIO STREET
PHILADELPHIA 34, PA.

mission of water vapor by having one or both closures paraffin dipped.

The filling and closing of open mouth bags has been facilitated by certain special constructions. The operator who fills the bags is aided by a quick opening container. Spot pasting of the tops of the plies of sewed bags accomplish this, while one face of a pasted bag has a thumb cut at the top. Before the filled bag is guided through the sewing machine, the tops must be formed and gussets closed. Pasting the plies at the gussets simplifies this forming operation. Likewise staggered gussets make the sewing easier.

It is often a problem to choose a proper construction. It is much better to overpack at the start and gradually reduce the strength to that required than to encounter trouble from use of a container that is too weak. Bag length should be twice the width. This shape is easier to handle and readily lends itself to safe stacking and palletization.

It is easier to decide how much mechanical strength must be built into the shipping sack than it is to determine the needed amount of resistance to the transmission of water vapor. Is it necessary to use one or two asphalt laminated plies or is a polyethylene coated ply required and what thickness of coating is necessary? Tests under normal atmospheric conditions must be run for several months and for dependable results require humidity and temperature recordings and frequent accurate weighings. Committee D10 of ASTM has developed an accelerated test which will soon be published as a tentative standard. It recommends using controlled conditions of 100 deg. F. temperature and 95 percent relative humidity. The interpretations of these accelerated tests will vary with the actual storage conditions and must be made in each specific case. Comparative results, between constructions, are of course dependable.

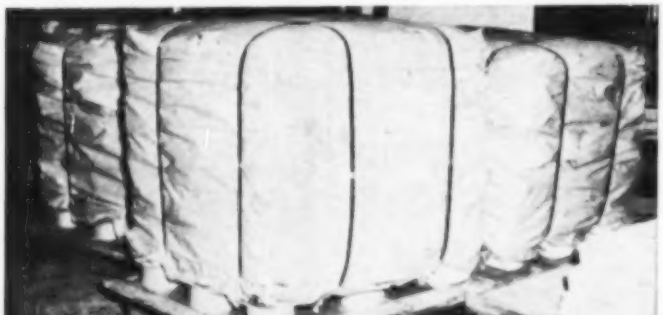
Proper handling, stacking, and carloading methods are pretty universally known today. Manufacturers of these containers have established standard practices which are available. Multiwall paper shipping sacks readily lend themselves to palletized handling and storage. If pallet loads are properly designed there is no danger of tiered piles toppling over.

Empty bags should be stored away from heating pipes in a relatively damp location. Bags containing from 6 to 7 percent moisture are strongest and storage conditions of 50 percent relative humidity at 70 deg. F. should approximate these conditions. If storage tends to reduce the moisture content of the paper, means should be found to increase the moisture in the air. Most bag manufacturers are equipped to ship empty bags on pallets and if they can be unloaded with fork lift trucks, economies are possible in handling and storing.

Some shippers include in each carload, a small number of overslip bags. In the event that a few bags are snagged or broken, the broken bags and contents are slipped into the empty containers and tied with string. This provides a handy means for transportation employees and customers to save material that might otherwise be lost.

Paper shipping sacks can be printed in two to four colors. This is done with rubber plates so that close registration is not possible. There should be a natural kraft outline between any two colors to prevent bleeding. Face printing is not as important as gusset and butt printing because it is not seen in stacks of filled bags.

Printed or colored tapes over the end closures can be used for identifying products. Tags can be sewn into



Palletized loads of empty bags can be obtained. They give added speed and flexibility in storage and intraplant movements.

either bottom or top closure. For easy opening, red looper threads may be used at the top closure with appropriate instructions for opening printed on the bag. These and other, features show the possibilities of developing an attractive appearing container and if the details of construction of the sack is carefully planned it will be enthusiastically received by the customers.

The development of a process for coating polyethylene onto kraft bag paper has given to bag manufacturers a means of incorporating greater protection into multiwall paper shipping sacks than has ever been possible. This plastic has many useful properties such as chemical inertness, light weight, tear resistance, good stretch, low temperature flexibility, grease proofness, water and water vapor resistance. Odorless and tasteless, it is non-toxic. It can be heatsealed. It has a high degree of resistance to acids and alkalis. In addition, it can be colored by the addition of pigments and dyes.

Multiwall bags containing a polyethylene coated ply have been used commercially for well over a year. They have been used for packing calcium chloride, powdered skimmed milk, molding and adhesive resins, as well as a number of other products. There is general agreement that they provide greater resistance to the transmission of water vapor than sacks having two asphalt laminated plies. One bag fabricator claims that a polyethylene sheet increases the strength of these containers over those of all plain kraft bags or combinations of kraft and asphalt.

The increasing popularity of multiwall paper shipping sacks is irrefutable evidence of the economy and ability of these containers to serve the chemical industry. The use of polyethylene in their construction may well increase the products that can be marketed in these bags.

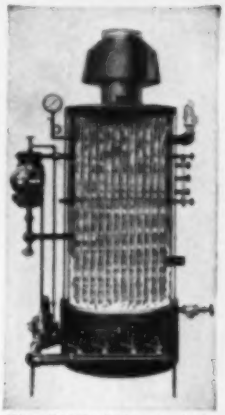
MCA Brings Warning Label Manual Up-to-Date

The moral and legal responsibility of a manufacturer to adequately warn all persons using, handling, or storing chemicals having hazardous characteristics has long posed a problem to producers of these substances. The need to provide complete warnings has been highlighted by the accelerated development of new and dangerous compounds in our industry.

In 1943, the Manufacturing Chemists Association by means of an industry meeting, emphasized the increasing importance of the problem

(Continued)

STEAM —AS YOU WANT IT . . . WHERE YOU WANT IT



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THE KANE BOILER PACKAGE

Each KANE BOILER PACKAGE is carefully considered by us as an "individual" job,—from the customer's requirements to the finished unit. And each BOILER PACKAGE is a compact, self-contained steam source that includes: the correctly sized KANE Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure, and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

Engineered Steam at its best with four decades of experience at your disposal—so, send your steam problem to us for study and recommendation.

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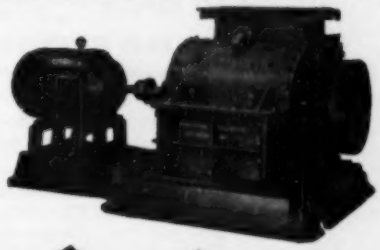
FOUR DECADES OF AUTOMATIC GAS-FIRED BOILER MANUFACTURING EXPERIENCE

GET UNIFORM REDUCTION

. . . and HIGH TONNAGE too . . . with an

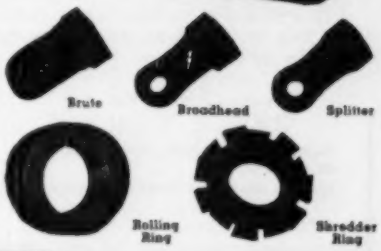
AMERICAN "24 Series" CRUSHER



You can maintain rigid control over uniformity while achieving high tonnage reduction of your materials . . . with an American "24." Equipped with ring or hammer-type rotors, this versatile crusher reduces all hardnesses of mineral or fibrous materials—rapidly and uniformly—to give you dependable, volume production—at low cost.

For the exact reducing action you require . . . rugged, balanced American rotor can be equipped with rolling rings or shredder rings—or rotor can be supplied for any of three hammer types.

Write for information on the complete line of Americans.



American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1219 Macklind Ave.
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POWERS

NO. 11 TEMPERATURE REGULATOR—*Controls Temperatures of Liquids or Air*

4 PLUS VALUES

1. OVER-heat Protection
2. Valve Stem Lubricator
3. Temperature Adjustment has OILITE Thrust Bearing
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Simple, Self-Operated, Economical —Dependable

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BETTER TEMPERATURE CONTROL

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OFTEN PAYS BACK ITS COST SEVERAL TIMES EACH YEAR

When you want a simple dependable control to maintain a constant uniform temperature install a Powers No. 11 Regulator.

PREVENTS OVER-HEATING—SAVES FUEL and LABOR

HELPS INSURE A UNIFORM PRODUCT • MANY GIVE 10 to 25 YEARS OF SERVICE

For valuable aid in selecting the proper type and size of regulator take advantage of our 59 years of experience. Contact our nearest office or write to • THE POWERS REGULATOR CO., 2756 Greenview Ave., Chicago 14, Ill. • 231 E. 46th St., New York 17, N. Y. • 1808 W. Eighth St., Los Angeles 5, Cal. • 195 Spadina Ave., Toronto, Ont.

WRITE FOR BULLETIN No. 329

THE POWERS REGULATOR CO., 2756 Greenview Ave., Chicago 14, Ill.

Gentlemen: Please send me Bulletin 329. Am interested in

control for .....

Name ..... Title .....

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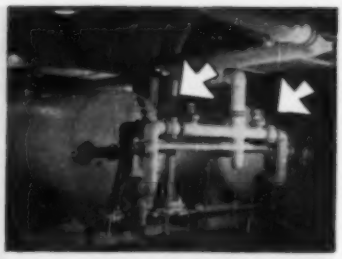
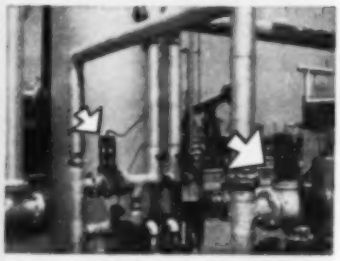
A-11

NO. 11 INDICATING REGULATOR

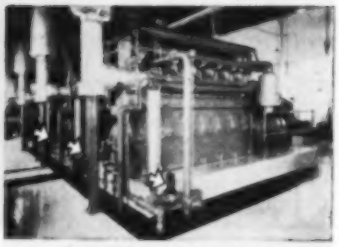
Has 4" Thermometer dial mounted on top of regulator. Both thermometer and bulb operate from same thermal system. Only one tapped opening required. Gives visual check on performance of regulator. Makes it easy to adjust for the right temperature.



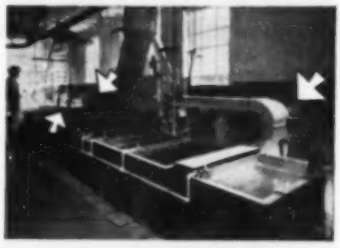
For WATER HEATERS and HEAT EXCHANGERS



For OIL HEATERS and TREATERS



For JACKET WATER COOLING IN DIESEL and GAS ENGINES



For METAL PLATING above below COOKING VATS

to chemical manufacturers. At that meeting, the Labels and Precautionary Information Committee was organized and charged with the responsibility of preparing recommendations for guidance of the industry.

This committee, although starting almost from "scratch" was well equipped for the job. The group consisted of top-flight chemists, toxocologists, lawyers, and packaging engineers. After deciding that the most effective warnings are provided by labels used directly on the packages of hazardous compounds, they prepared a philosophy for preparing these warnings. Each type of hazard was weighed and classified according to type and severity and illustrative warnings were prepared. The result was published by the association. This manual has since been revised twice—the last revision of which was issued last autumn. It is interesting to note that the basic principles which were evolved by the original group, five years ago, have been reaffirmed but considerably improved and enlarged by each revision.

These manuals are used by most firms in the preparation of their cautionary labels. They have also been accepted by state regulatory bodies and several state statutes have been modeled on the principles of labeling as evolved by this group.

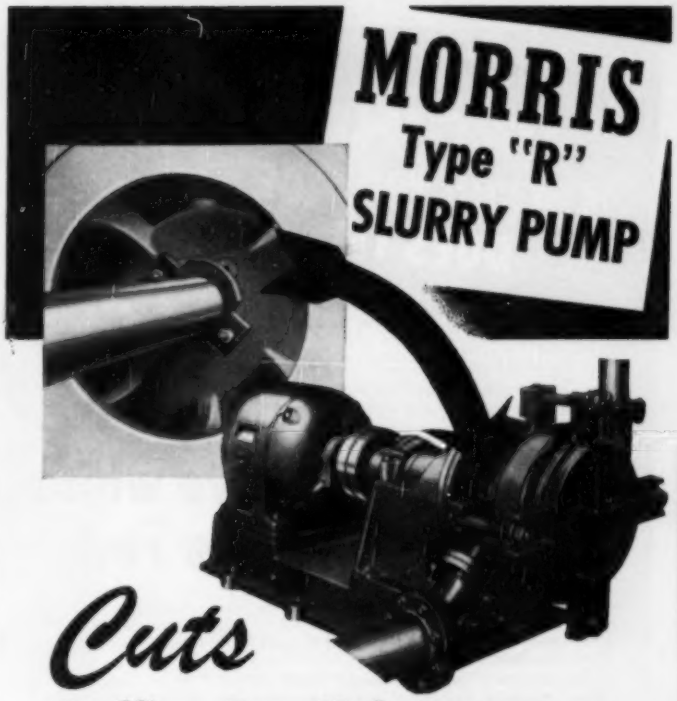
In December, following the issuance of the second revision of their manual, the LAPI committee held a labeling symposium which was attended by a large group from industry. Open discussions of the principles for preparing cautionary labels were led by specialists. An important part of the symposium consisted of illustrative displays of labels for a large number of different types of compounds.

The work of this committee is deserving of high commendation.

Fiber Cans Have Their Advantageous Too

"The fiber can offers certain inherent advantages which are possessed by no other rigid container. For example, it is usually less expensive and lighter in weight than other containers. In addition, it can be provided with suitable reclosure devices, and can be made resistant to water, water vapor, oil, grease, and other substances. These and other properties have enabled the fiber can to gain wide acceptance as a package for such dry food products as salt, baking powder, cocoa, spices, and cereal; other dry

(Continued)



Cuts

Stuffing Box Maintenance...

Fluctuating Sealing Water Pressure Is No Problem when you install a Morris Type R Slurry Pump. Even when peak demand on the plant supply line lowers the pressure, this pump operates with minimum stuffing box wear. Only 10% normal sealing water pressure is actually required . . . because Morris Type R stuffing box is subject to *suction pressures only*. Low line pressure is therefore sufficient to shut out grit effectively . . . and still protect the slurry from objectionable dilution.

If no other Type R feature were listed, here's one that says: Specify Morris. But there's even a bigger story. Ask for further information on this outstanding slurry pump, servicing scores of material handling applications.

OTHER MORRIS TYPE R FEATURES

✔ EASY TO INSTALL ✔ EASY TO DISMANTLE
✔ EASY TO MAINTAIN ✔ SIMPLEST DESIGN
✔ MINIMUM NUMBER OF WEARING PARTS

Specify MORRIS Type "R" SLURRY PUMP

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
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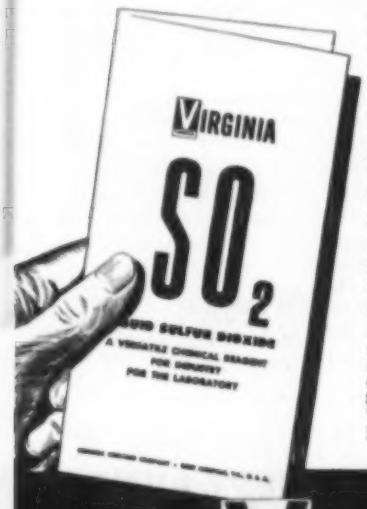
MORRIS *Centrifugal Pumps*

"VIRGINIA" SULFUR DIOXIDE DOES IT!

MARASCHINOS are white before they're red

Nature didn't contribute the bright red, or green, color that points up the maraschino cherry in your cocktail or salad. Chances are it was first bleached white with sulfur dioxide, so that it could be harmlessly dyed the desired brilliant hue.

Inexpensive "Virginia" Liquid Sulfur Dioxide (SO_2), dispensed by means of special equipment devised by "Virginia" experts, provides the necessary decolorizing and preservative action. "Virginia" chemists—with 29 years' experience covering 40 different industries behind them—are well versed in *all* the properties of SO_2, including its use as a reducing agent, neutralizer, antichlor, and pH control.



This experience, plus the exceptional quality of its SO_2, has made "Virginia" the world's largest producer of this vital chemical. "Virginia's" excess plant capacity, vast storage facilities, and privately owned tank cars, drums, and cylinders assure prompt deliveries of SO_2 in any quantities you want.

Such an outstanding combination of service, facilities, know-how, and fine product makes "Virginia" your logical choice if you can use SO_2 for the improvement of your products or processes and lowering costs. We'd like to investigate the possibility, without cost or obligation to you. Send for folder on "Virginia" SO_2. VIRGINIA SMELTING COMPANY, Box 21, West Norfolk Virginia.

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VIRGINIA Chemicals

products such as scouring powders, certain tobacco products, dry chemicals, and chemical formulations; and more recently for liquid milk and frozen foods. With the continued development by organic chemists of resistant synthetic materials which can be employed as barriers in fiber containers, it is probable that in the future the fiber container will gain an even more prominent position in the packaging field."

The above is quoted from American Can Co.'s Research Bulletin No. 15 of August 1949. It contains a description of each of the three types of cans, explains methods of fabrication, analyzes constructions and discusses the protective features of each type.

New Modern Packaging Encyclopedia Is Here

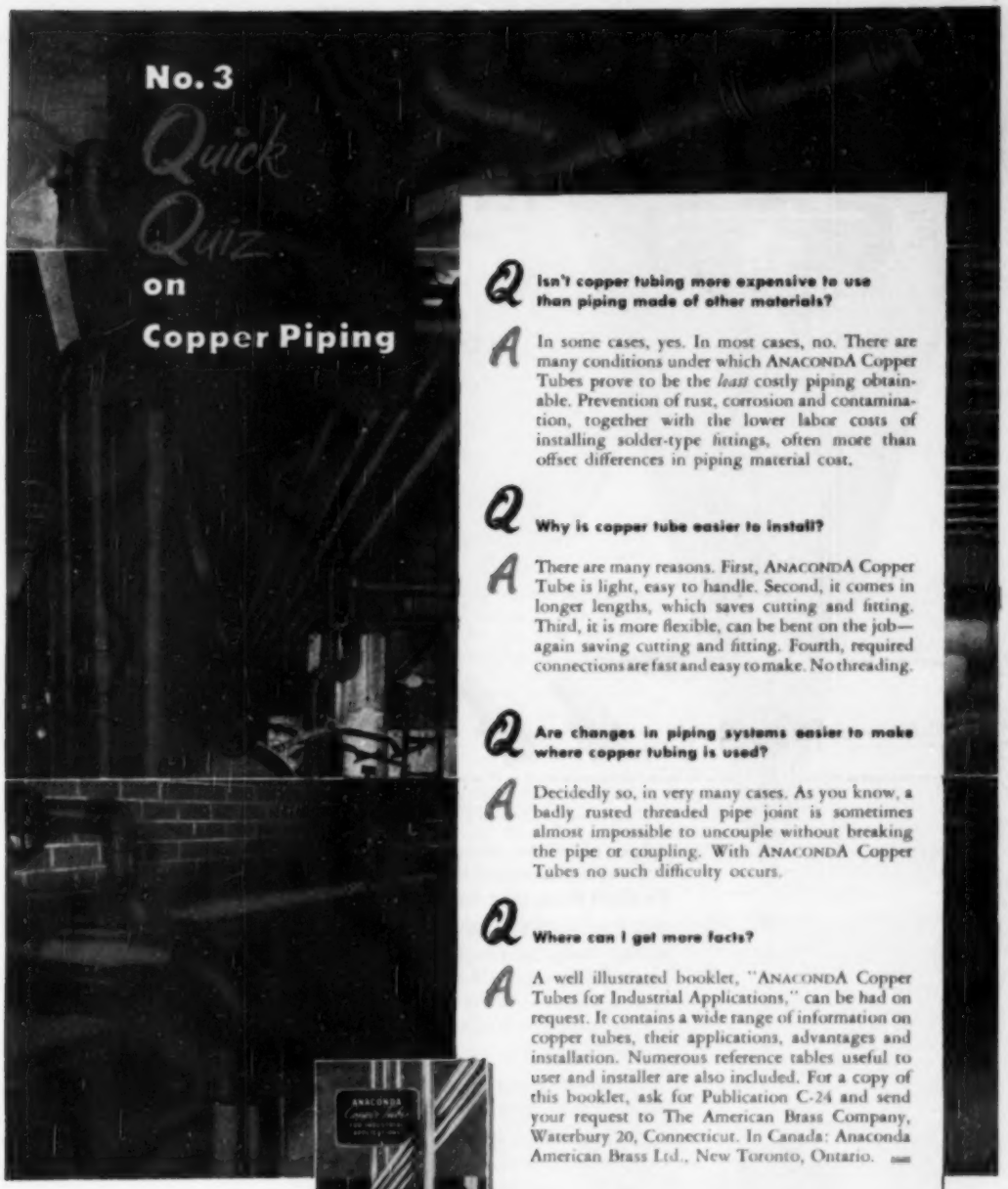
A new edition of Modern Packaging Encyclopedia has been published by Packaging Catalog Corp., New York. This 1950 edition is the latest of an annual series that started in 1929. Each year the encyclopedia has been brought up-to-date and enlarged as a basic source of data on packaging. This year more than 60 percent of the articles are new. Some of the subjects and titles have been repeated, but by drawing on different authors a new slant is taken on some of the familiar subjects. An impressive number (84) of packaging experts has contributed to the newest edition, along with a multitude of industrial, trade and governmental organizations.

Of special interest to *Chemical Engineering* readers are the sections on shipping containers and equipment, materials handling equipment, package forms and package planning.

War Emergency Authorization To Be Cancelled

War shortages of metals made it expedient for the ICC to issue special temporary authorizations under Section 28h of the Regulations for the re-use of single trip steel containers for transporting certain hazardous articles. These temporary authorizations will be cancelled as of Aug. 31, 1950, according to a recent announcement.

—*End*



No. 3

Quick Quiz on Copper Piping

Q **Isn't copper tubing more expensive to use than piping made of other materials?**

A In some cases, yes. In most cases, no. There are many conditions under which ANACONDA Copper Tubes prove to be the *least* costly piping obtainable. Prevention of rust, corrosion and contamination, together with the lower labor costs of installing solder-type fittings, often more than offset differences in piping material cost.

Q **Why is copper tube easier to install?**

A There are many reasons. First, ANACONDA Copper Tube is light, easy to handle. Second, it comes in longer lengths, which saves cutting and fitting. Third, it is more flexible, can be bent on the job—again saving cutting and fitting. Fourth, required connections are fast and easy to make. No threading.

Q **Are changes in piping systems easier to make where copper tubing is used?**

A Decidedly so, in very many cases. As you know, a badly rusted threaded pipe joint is sometimes almost impossible to uncouple without breaking the pipe or coupling. With ANACONDA Copper Tubes no such difficulty occurs.

Q **Where can I get more facts?**

A A well illustrated booklet, "ANACONDA Copper Tubes for Industrial Applications," can be had on request. It contains a wide range of information on copper tubes, their applications, advantages and installation. Numerous reference tables useful to user and installer are also included. For a copy of this booklet, ask for Publication C-24 and send your request to The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

For better Piping...use ANACONDA®

COPPER TUBES

A Versatile Valve

FOR SMALL-FLOW CONTROL

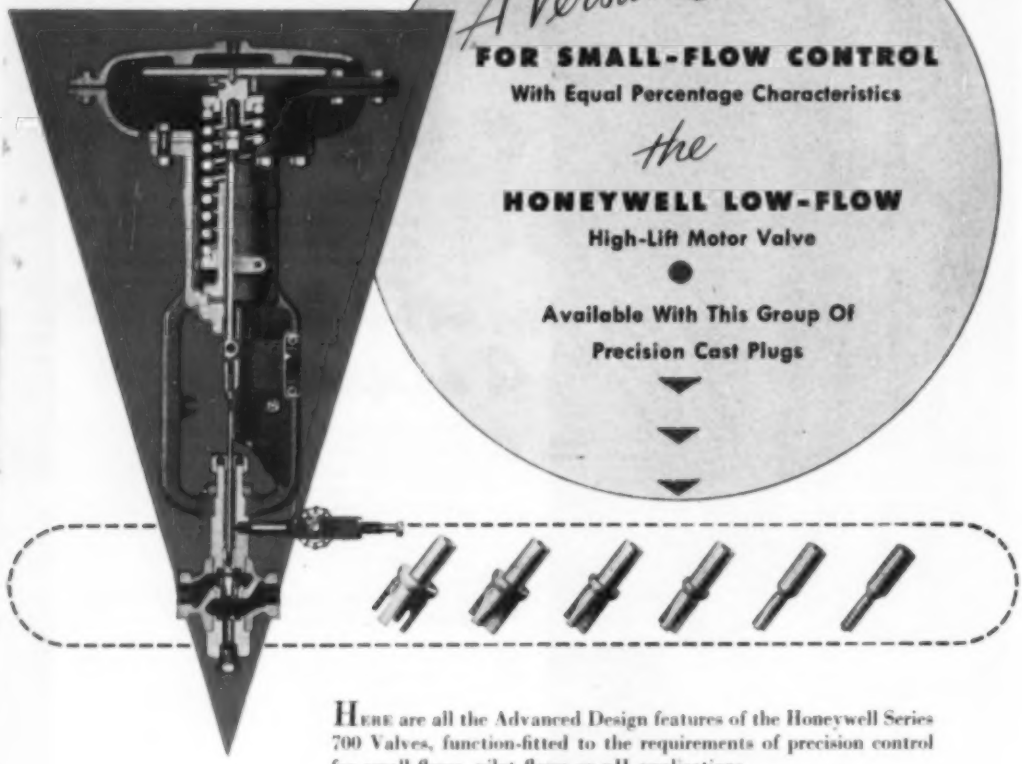
With Equal Percentage Characteristics

the

HONEYWELL LOW-FLOW

High-Lift Motor Valve

Available With This Group Of Precision Cast Plugs



HERE are all the Advanced Design features of the Honeywell Series 700 Valves, function-fitted to the requirements of precision control for small flows, pilot flows or pH applications.

The Honeywell Low-Flow is a motor operated valve possessing Pre-molded Neoprene Diaphragm with Rolling Action, Pivot-Mounted Inner Plate, Cradle-Mounted Upper Spring Flange, Duplex Stem Bearings and One-Piece Bonnet . . . available with a series of different size plugs, each of which changes flow about 7% with every 1% change in stem lift.

This all adds up to a new high in versatility and precision for a critical phase of flow control operations . . . well worth your investigation.

Call in your local Honeywell engineer for detailed information on types of construction, materials, connections, ratings and accessories . . . he is as near as your phone!

Write, today, for a copy of Bulletin 700-2!

WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL

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Honeywell

DIAPHRAGM VALVES

AND PROCESS CONTROL SPECIALTIES

News From Abroad

SPECIAL CORRESPONDENCE

McGraw-Hill Survey Gets the Answers on Effect of Devaluation on Chemicals

NOTE: *This round up of the world-wide effect of devaluation was made as a special service to* Chemical Engineering *readers.*—EDITOR.

FIVE months have passed since the British mid-September devaluation—enough time in which some of the effects on the chemical industry, globally, can be determined, even if measure cannot be taken of the full impact of the world currency shakeup.

It probably will be a year or more before final judgment can be passed on the results of devaluation. Meanwhile, a spot check by McGraw-Hill World News correspondents in various key countries has turned up some significant trends.

In terms of all types of trade, devaluation has accomplished just about what it was expected to do. In short, there have been two clear effects:

1. A shift in trade. Britain gains as the relative cost of U. S. goods goes up in the sterling area and in third markets. This helps to close the trade gap between the dollar and non-dollar world.

2. Inflation. The cost of living climbs with rising import prices. But so far, price increases haven't threatened the competitive advantage gained through devaluation.

Just how the chemical industry, globally, has been affected can be seen in the country-by-country reports that follow:

BRITAIN

Wholesale prices of chemicals have increased 5 percent in the period since devaluation, according to the Board of Trade index.

The increase in the prices of chemical intermediates imported from the U.S., such as polystyrene and petroleum derivatives, has not fully been reflected in the volume of such imports, but is expected to have its maximum effect early in 1950. Meantime, an increased interest in cellulose acetate molding powders and thermoplastic powders is evident.

Chemicals have not risen to anywhere near the same extent as nonferrous metals (27 percent), wool (23 percent), cotton (14 percent) or cereals (16 percent). But there is disturbing evidence in the sum total of these increases in raw material costs in only three months after devaluation that manufacturers face difficult times in 1950.

FRANCE

Last September's devaluation has worked against the French chemical industry.

The industry is heavily dependent on imported raw materials. The devaluation raised franc prices of these in almost every case. Non-ferrous metals from the dollar zone were particularly severely affected. The price of copper on the French market rose 34.9 percent following the devaluation. Zinc prices jumped 11.8 percent; tin prices 14.4 percent.

The price of imported pyrites has gone up too. The chemical industry as a whole will pay about 350 million francs more for its pyrites this year than last. That's not much compared to the total bill of 22 billion francs. The reason this increase is so small is that the French industry stockpiled pyrites before devaluation. But eventually the devaluation may result in steeper price increases for pyrites.

Coal prices weren't lifted by devaluation for two reasons: France slashed imports of U.S. coal to the bone. Western Germany reduced the dollar price of its coal.

Although the franc was revalued 11 percent with respect to the pound sterling subsequent increases in sterling prices of chemical raw materials have increased their import prices to the French chemical industry by 15 percent.

Even prices of certain products from the French overseas territories were increased in anticipation of the devaluation. Most telling price increase here was that of North African phosphates.

Exportwise the devaluation turned the terms of trade against the French chemical industry. Exports increased 7 percent during the period October-November compared to July-August by volume for all chemicals. Total tonnage increased to 365,304 compared to 339,228. But the value of these exports only went up 894 mil-

(*Continued*)

BRITISH MONSANTO RESEARCH CENTER

Monsanto Chemicals Limited have acquired Fulmer Hall, at Fulmer in Buckinghamshire, they are converting the property into a research center. Fulmer Hall will be an addition to the new Nickell Laboratories at Ruabon opened in May.

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lion francs rising from 11,752 million to 12,646 million francs. That works out to a 16 percent reduction in the real hard currency value of exports calculated in dollars at the post-devaluation rate of exchange.

Actually this isn't as important as it sounds since our 45 percent ad valorem tariff plus 7 percent duties on chemicals keeps French chemical exports to the U.S. to a trickle. But the reversal of the terms of trade of the French industry is important for exports to other relatively hard currency areas like Switzerland.

In addition to these direct effects of the devaluation, it may have very serious indirect repercussions on the French chemical industry. By cutting the total imbalance of intra-European trade in half it has made possible drastic liberalization of this trade. Leaders of the French chemical industry are scared to death of the competition which would result from such liberalization. They fear that the high social security costs they have to bear plus their dependence on imports for raw materials will make it impossible for them to compete with other European chemical industries, notably German industry, on an equal footing.

AUSTRALIA & NEW ZEALAND

Even before devaluation, imports of American chemicals were restricted to items not available from easy-currency sources. Imports within this range must continue until equivalents are offered elsewhere. Prices have been marked up 44 percent, but because of downward tendency in American prices, net increase since devaluation has been less than that. In both dominions the ceiling on imports is set by the dollar shortage, not by the higher price which users must pay.

BRAZIL

Some chemicals are now being bought in European countries of devaluated currencies which previously were purchased in the U.S. But by and large there has been no major switch.

ARGENTINA

Devaluation of the peso and other world currencies has had little effect so far on the chemicals industry in Argentina, where exports are small and where no imports have been permitted since new rates of exchange were fixed and new trade regulations published in October and November.

The shift in exchange rates has left the trade generally pessimistic, since dollars which formerly cost 3.7313 or 4.2289 pesos each will in

(Continued)

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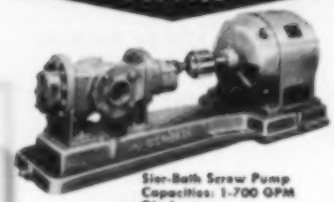

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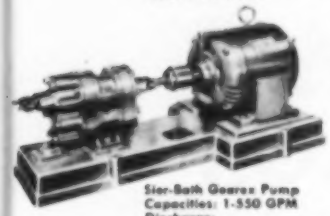

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FOREIGN NEWS, cont. . .

the future cost a minimum of 5.3714 and a maximum of 6.0857 pesos; prices will rise at least 27 percent, possibly 63 percent.

SWEDEN

Price trends after devaluation have been uneven. Some chemicals have risen more than 44 percent (sulphur, calcium chloride, 45–50 percent). Raw phosphates and sodium sulphate rose 20–30 percent, but sodium carbonate fell 17 percent. Swedish buyers have been holding off for expected price falls. Imports from the Netherlands, Belgium, France and Britain have been unusually large in the last two years, but Germany is now coming back into the market. The Swedish manufacturers evidently think it is best to inject competition now, and have been pressing for complete free-listing of chemicals.

NETHERLANDS

Prices of imports from the dollar area have risen in proportion to the devaluation percentage, i.e. by 43 percent, other import-prices have slightly increased, and as dollar imports form a relatively small portion of total raw material imports for the Dutch chemical industry, the rise in both export and domestic prices has only been small. The 5 percent wages rise has little influence on the price level, as the chemical industry is not "labor-intensive." Dutch exports of chemicals to the U.S. have slightly increased since devaluation, but the Dutch industry seriously complains of the almost prohibitive character of American customs tariffs and regulations.

ACHEMA Exhibition Coming to Frankfurt-on-Main in July

Frankfurt–ACHEMA, an exhibition covering the whole field of chemical equipment, sponsored by the DECHEMA (Deutsche Gesellschaft fur Chemisches Apparatewesen) will be held in Frankfurt-on-Main during the week of July 9 to 16 in conjunction with a meeting of that society.

More than 350 leading firms engaged in the manufacture and distribution of chemical equipment have booked 102,000 sq.ft. of floor space in the six large exhibition halls at disposal by the date fixed for the first close of applications. Plans for securing another hall are now under consideration. This will afford foreign manufacturers of chemical equipment the opportunity of taking part in the exhibition.

It may be expected that a whole series of new developments in the field of chemical equipment will be submitted for discussion for the first time within the scope of this exhibition and the meeting held in connection with it. A large number of papers on the subject have been announced.

The following meetings will be held in Frankfurt during the exhibition week: (1) General Meeting of the Gesellschaft Deutscher Chemiker (2) General Meeting of the Deutsche Gesellschaft fur Chemisches Apparatewesen E.V. (3) Special Meeting of the VDI-Fachausschuss fur Verfahrenstechnik (4) Special Meeting of the Sicherheitsingenieure der Berufsgenossenschaft der Chemischen Industrie (5) Special Meeting of the Verein Deutscher Eisenhuttenleute.

The students' excursions also deserve mention. The DECHEMA plans to invite the occupants of the chairs for chemical techniques and the construction of equipment and related subjects at the technical colleges and universities in Germany and abroad to visit the ACHEMA IX with their students. Arrangements are being made to secure special railway fares and reduced rates for hotels and other accommodation. Students will receive a cross-section through the whole field of chemical equipment in a series of lectures to be held at five morning sessions.

Thorough preparation for a visit to the exhibition and meeting is made possible by study of the ACHEMA-jahrbuch (Year-Book) 1940/50, containing 5-600 pages of information on all the products exhibited. A copy of the book, which will be ready in April, will be available without charge for those taking part in the meeting and those visitors planning to visit the exhibition.

A folder containing an invitation and giving all details is on the press, and its distribution may be expected this month. It will describe the extent and importance of the ACHEMA IX and all the associated functions. It can be obtained by writing to the DECHEMA, Ulmenstrasse 10, Frankfurt-on-Main. A copy will be supplied free of charge.

Commercial Alcohol Opens Gatineau Insulation Unit

Ottawa — Commercial Alcohol Co.'s new magnesia insulation plant adjoining their alcohol plant at Gatineau, Que. went into production late in January. The new plant will manufacture 85 percent magnesia insulation using carbon dioxide, a byproduct of the fermentation process

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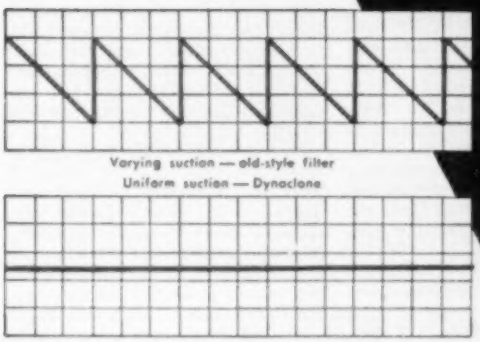

Varying suction — old-style filter
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This uniform suction is achieved by a simple device which cleans the filter bags successively by a reverse flow of air—the same suction which draws the dust onto the filter cloth is reversed to blow it off.

Since this reverse air suction operates continually, the new Sly Filter requires no shutdowns for removing dust from the cloth.

No mechanical shaking or flexing device is needed, eliminating all strain and wear on the filter bags.

The simplicity of design and operation and elimination of all auxiliary equipment for periodic cleaning of bags mean a saving of floor space and a very minimum of maintenance.

The result of long experimentation and exhaustive tests, the Sly Dynaclone has thoroughly proved itself. It provides substantial savings over any other type of cloth screen dust collection. Write for complete information.

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in alcohol manufacture. Its entire output wil lbe sold under a seven-year contract to Canadian Johns-Manville.

The equipment, all automatic, was designed by Canadian Johns-Manville and that company's engineers will supervise production in the initial stages.

Commercial Alcohol's alcohol plant is still operating at approximately 80 percent of capacity and it may be two or three months yet before all production problems can be solved. At full production plant can produce 2 million gallons of alcohol annually.

Dow Continues Sarnia Plant Expansion Program

Ottawa—Dow Chemical of Canada Co., subsidiary of Dow of Midland, Mich., and often mentioned as eyeing chemical byproduct possibilities in Canada's western prairie oil fields, is reported ready to start a $25 million expansion program in the Sarnia, Ont., area where the company already has invested over $15 million.

Program announced for 1950 includes a third salt well, a new car wash house, new compressed air system, four more glycol storage tanks, and several additional cells for the chlorine plant.

Devaluation Fails to Stimulate British Chemical Exports to the United States

London—British chemical exports in December rose to £7,040,000 from £6,890,000 in November. Last year Britain's chemical exports totaled £89,090,000, against £83,580,000 in 1948 and £67,400,000 in 1947. Chemical exports thus continued to rise at a slower rate than anticipated. Government quarters are particularly disappointed at the fall of chemical exports to the Argentine and the United States and fear that the gains in trade with Africa and the Far East which, together with larger purchases by India and Pakistan, were the principal bright spots in 1949 will be wiped off this year. The trade expansion with North America immediately after the devaluation seems to have been short-lived; shipments to Canada fell off sharply in December, and dollar customers have not been conspicuous by enquiries and orders in the new year. Trade with some other overseas countries is proving very difficult at present because they are short of sterling and dollars.

Nevertheless the outlook is regarded with some confidence by British exporters, chiefly because of the new trade agreement with Sweden and Yugoslavia. Sweden will buy British chemicals to the amount of £6,000,000 per year, which is almost twice the amount imported in 1948 and not far short of three times the value of British chemical exports to Sweden in 1947. The agreement has been welcomed by British exporters because it augurs well for the coming negotiations with other countries in northern and western Europe and especially because it is in Sweden that German competition is felt most acutely by British firms. Chemical expocters in both east and west Germany have announced their intention to place a growing part of the increasing chemical production in the export market, and the trade agrement with Sweden suggests that British exporters need not fear any curtailment of their exports from this quarter.

The agreement with Yugoslavia is less important as far as the volume of proposed shipments is concerned. Yugoslavia is expected to take substantially more dyestuffs, pigments, pharmaceuticals and miscellaneous chemicals from Britain than before the war and in the first postwar years, but British chemical trade with Yugoslavia had always been comparatively unimportant because of the more favourable geographical position of Central European suppliers. Political factors have cut off Yugoslavia from most other sources of supply. Differences with the eastern bloc have brought trade with eastern Germany to a standstill, while western Germany awaits a satisfactory settlement of the question of the prisoners of war before starting trade talks. In these circumstances British exporters enjoy an appreciable but probably only temporary advantage in this Balkans market.

The steady improvement in supplies has caused the authorities to proceed with the decontrol of chemical commodities. The Coal Tar Order, 1943, and the Coal Tar Products Prices Order, 1947, became ineffective on January 1, except for benzene and allied light oils. Free acquisition and use of materials for the manufacture of paint, lacquer, and varnish was permitted in January. Lithopone was decontrolled in January, even though several months will elapse before home production can

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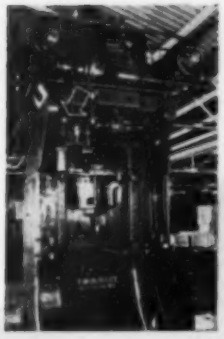

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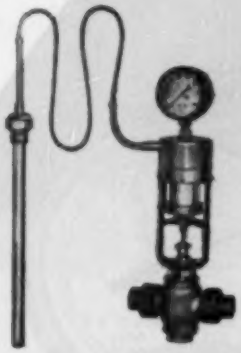
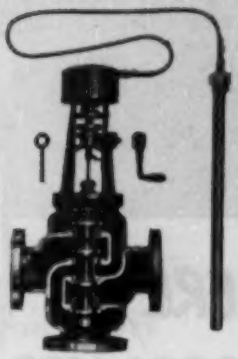


Sylphon Regulator 923-T. Self-contained, self-powered. Thermostatically maintains liquid temperature. Equipped with indicating thermometer. Sizes, ½" to 4".



Sylphon Regulator 923-3 equipped with 3-way valve. Directs all or part of water through bypass. Can be manually opened and closed. Sizes, ½" to 6".

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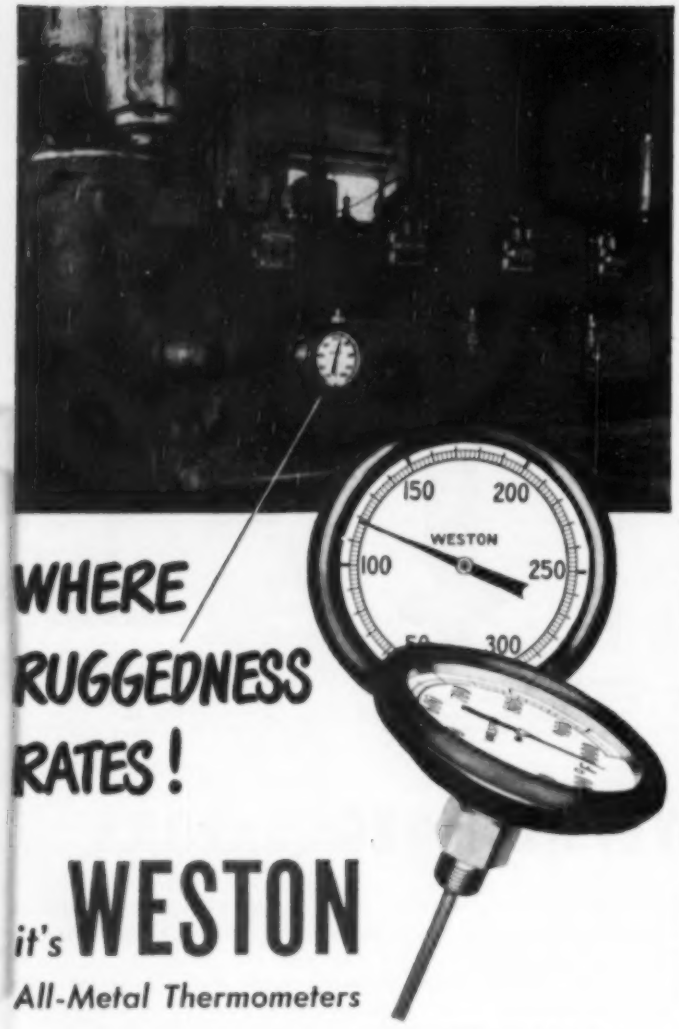

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take care of the bulk of local needs 20 percent of which are at present still being met by imports. Most important of all, the official control over sulphuric acid ended on January 31. Certain supervisory functions over importation and distribution of raw materials for the manufacture of sulphuric acid are carried out by the National Sulphuric Acid Association Ltd., acting as agent for the Board of Trade, but supply and demand are in balance.

A new, revised list of chemical products subject to or exempted from the Key Industry Duties has been published. There are a number of additions to and removals from the list of chemicals exempted from KID. An appreciable number of new products have been put on the list of manufactures on which duty at the rate of 33 percent of their value has to be paid, but these changes are comparatively unimportant. No significant alteration has been made in the Token Import Scheme under which manufacturers in certain overseas countries, including the United States, may import goods to the value of 20 percent of their supplies in 1936-38 into the United Kingdom in order to keep their products before the British public. Paints, medicinal preparations packed ready for retail sale, toilet preparations and automobile maintenance products are items of chemical interest under the Token Import Scheme.

BIGGER OUTPUT IN 1950

According to the British report to OEEC, a substantial increase in the output of chemicals is expected this year to meet an increased demand for exports and for the replacement of dollar imports. The authorities are now drawing up the Economic Survey for 1950, which is to show in greater detail where and how import economies are to be effected. It is expected that imports of solvents, organic intermediates, materials for the plastics industry, dyes and pigments will be reduced substantially. At the same time it is hoped to relax import licensing requirements still further. Among products which may now be freely imported are wool grease and various vegetable seeds and oils including castor oil, rapeseed, and rubber-seed oil, lecithin, sperm oil, acid sodium pyrophosphate, carmine, compounds of thorium, cerium and other rare earth metals, of molybdenum and vanadium, lanolin, magnesium glycerophosphate, dentifrice, shampoo powders packed ready for

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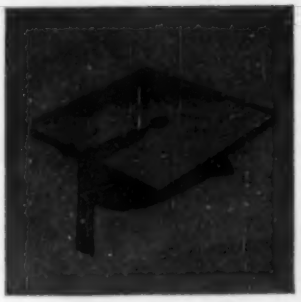

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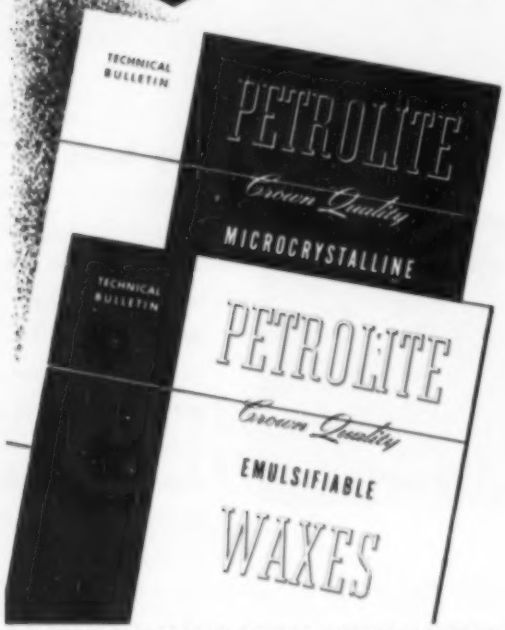

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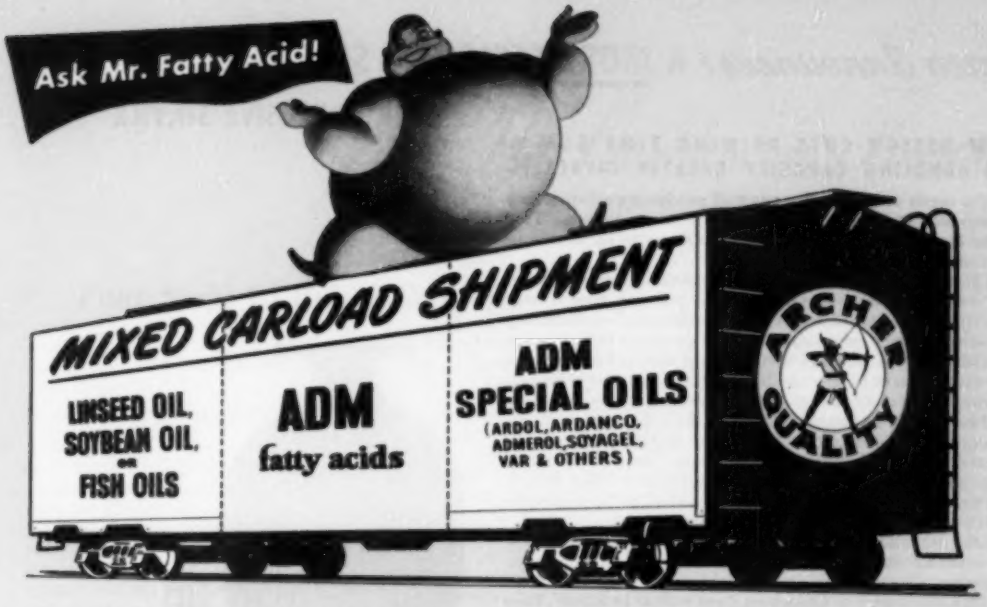
PW-50-A

retail sale, and shaving cream. Some of these products have been freed from license restrictions because the amounts involved are small and hardly justify the administrative expenditure involved in licensing control; others have been freed in order to stimulate competition.

Advance reports on the British Industries Fair to be held early in March indicate that some of the new chemical products production of which began last year will be shown for the first time. Among these are germanium and gallium and their oxides, a series of brown pigments based on lead chromo-molybdate for use in paints, leather finishes, etc., several new penicillin compounds designed to obviate frequent injections, itaconic acid, and glucono delta lactone which is offered as an easily transportable form of gluconic acid. Para-amino salicylic acid will soon be available in substantially larger quantities. A new systemic insecticide is being offered by Pest Control Ltd. It is known as Pestox 3, has bis (bisdimethylamino) phosphonous anhydride as its active constituent, and will be distributed in the United States by Dow Chemical Co., which is reported to have provision for its later manufacture under license. Glaxo Laboratories Ltd. last month announced a new soluble protein food, calcium salt of milk casein, recommended for invalid or everyday meals. Shell Chemicals Ltd. offers a new detergent, Lensex 390, for use by laundries and textile industry. It is said to be superior to Teepol in that it has better detergent properties, greater lathering power, better wetting and dispersing qualities. Shell has also extended ist range of Apiezon oils, greases and waxes for high vacuum work. The Manchester Oil Refinery Ltd. is marketing a new cutting oil designed to meet the need for an extreme-pressure soluble cutting oil for use when nickel-chrome and other exceptionally tough alloy steels are machined; it is called Supramor Galactol E.P. Monsanto Chemicals Ltd. has purchased from the National Aluminate Corp. of America the latter's patent rights in the United Kingdom for the manufacture of the colloidal dispersions of silica sold in the United States under the trade name "Nalcoag." The results of both the American company's and Monsanto's own experience, it is announced, are to be incorporated in the further development of these products, which will continue to be sold under the trade name of "Syton."

—*End*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MIXED CARLOAD SHIPMENT
LINSEED OIL, SOYBEAN OIL, or FISH OILS
ADM fatty acids
ADM SPECIAL OILS (ARDOL, ARDANCO, ADMEROL, SOYAGEL, VAR & OTHERS)
ARCHER QUALITY

SAVE A PENNY A POUND ON CARLOADS OF fatty acids AND OILS

● Here's an important price advantage that *only Archer-Daniels-Midland Company* can offer you...a cash saving of *more than a penny a pound* on every 30,000 lb. shipment of oils and fatty acids.

Because ADM can supply almost every type of vegetable oil and fatty acid, you can very readily switch from LCL shipments to the rock-bottom price level of mixed carload or compartment tank car purchases. A lower base-price plus freight savings will reduce your costs *more than a penny a pound* on mixed carload shipments . . . considerably more on compartment tank cars.

Your orders can include linseed, soybean, fish oils, any ADM Special Oils, any ADM Fatty Acids. Order raw, refined, bodied, blown or chemically modified oils. Quantities as small as a drum of one oil can be included in mixed carloads or 1500 gallons in compartment tank cars.

Check our broad line of Fatty Acids at the right. Then mail coupon below for literature describing other ADM products and for information on the ADM Carload Purchase Plan. Schedule ADM mixed carload or compartment tank car purchases—for lower base prices, lower freight costs, reduced inventories, and *assured satisfaction!*

Send For Data on ADM Carload Purchase Plan

The Complete Line of ADM Fatty Acids

FATTY ACID TYPE AND GRADE	PROTECTIVE COATINGS	SYNTHETIC RESINS	INKS	PUTTY AND CAULKING COMPOUNDS	METALLIC SOAPS	LIQUID SOAPS	WAXES AND POLISHES	INSECTICIDES AND DISINFECTANTS	LUBRICATING GREASES	COSMETICS	PHARMACEUTICAL
LINSEED											
Water White	X	X	X								
Regular	X	X	X	X	X	X		X			
SM-500	X	X	X	X	X	X		X			
SM-600	X	X	X	X	X	X		X			
Essential Unsaturated Free Fatty Acids											X
SOYA											
Water White	X	X	X								
Regular	X	X	X		X	X		X			
RO-4	X	X	X		X	X		X			
RO-10	X	X	X	X	X	X	X	X	X		
RO-11S	X	X	X		X			X			
CORN-SOYA Double-Distilled				X		X	X	X	X		
CORN Double-Distilled				X		X	X	X	X		
COTTONSEED Double-Distilled		X			X		X	X	X		
COCONUT Double-Distilled		X				X		X		X	

Take the Scientific Shortcut with

ADM fatty ACIDS

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Please send details on the ADM Mixed Carload and Compartment Tank Car Purchase Plan.

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Durco Announces: A MORE EFFICIENT SELF-PRIMING PUMP

FOR CORROSIVE SERVICE

NEW DESIGN CUTS PRIMING TIME 66⅔%
AIR-HANDLING CAPACITY GREATLY INCREASED

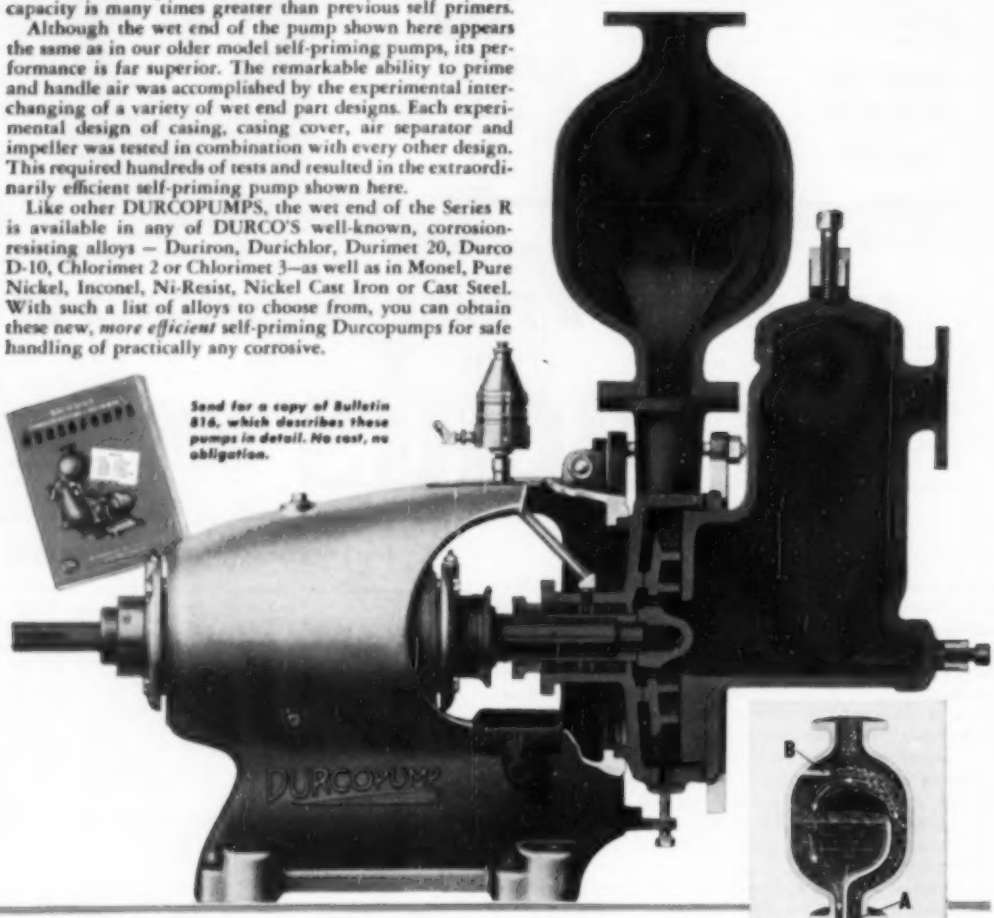
As the result of twenty-five years of producing self-priming pumps and testing our own pumps and others, we say, "This is the finest self-priming pump available today for handling corrosive solutions."

Thoroughly tested in the field by customers, as well as in our own plant, test records show that priming time is only one-third that required by earlier models, and air-handling capacity is many times greater than previous self primers.

Although the wet end of the pump shown here appears the same as in our older model self-priming pumps, its performance is far superior. The remarkable ability to prime and handle air was accomplished by the experimental interchanging of a variety of wet end part designs. Each experimental design of casing, casing cover, air separator and impeller was tested in combination with every other design. This required hundreds of tests and resulted in the extraordinarily efficient self-priming pump shown here.

Like other DURCOPUMPS, the wet end of the Series R is available in any of DURCO'S well-known, corrosion-resisting alloys – Duriron, Durichlor, Durimet 20, Durco D-10, Chlorimet 2 or Chlorimet 3—as well as in Monel, Pure Nickel, Inconel, Ni-Resist, Nickel Cast Iron or Cast Steel. With such a list of alloys to choose from, you can obtain these new, *more efficient* self-priming Durcopumps for safe handling of practically any corrosive.

Send for a copy of Bulletin 816, which describes these pumps in detail. No cost, no obligation.



This drawing shows how the Series R DURCOPUMP operates in priming. When the pump is started, the water is thrown upward into the air separator through port A, while air is drawn in from the suction line at the eye of the impeller. Water and air pass into the air separator. The water, baffled by plate B, returns through port C. The air passes into the discharge line. When the air in the suction line is evacuated, the impeller discharges liquor through both ports A and C.

THE DURIRON CO., INC., DAYTON 1, OHIO

Branch Offices in Principal Cities

DURCO

DURCO Adv. 102-GM

The Corrosion Forum

EDMOND C. FETTER, Managing Editor

Four Steps to Better Coatings

A good working knowledge is easier to get than it looks

KENNETH TATOR, *Kenneth Tator Associates, Coraopolis, Pa.*

In the correction of any corrosion problem, qualified corrosion engineers consider singlely or in combination four different methods of approach: corrosion resistant metals and alloys, non-metallic inert barriers (of which organic coatings and linings represent the predominant materials), cathodic protection, and corrosion inhibitors. Of these the organic coatings and linings have two strong appeals: they are simple to apply and the protection mechanism is understandable and predictable.

In spite of this apparent simplicity and predictability, too many organic coating and lining applications have resulted in disastrous equipment failure. Instances of such failure have been analyzed and the cause in most cases is inadequate working knowledge of the performance and the limitations of the organic materials. It would be hard to decide who is more to blame—the technical salesman or the user.

STEP 1—REMEMBER TEN TYPES

This lack of working knowledge cannot be attributed to complexity of classification. There are but 21 different organic bases in use today for corrosion resistance, as contrasted with 27 basic metals in the same use. The organics, unlike the metals, offer no general advantage in being compounded with each other, and hence the possible combinations are far less than is possible with metals. In spite of this greater complexity of metal classification, the metals, their performances and limitations, are general knowledge. Actually in the case of organic materials the problem is considerably more simplified as there are only 10 basic organic types in common use for corrosion resistance. These ten are natural rubber, bitumens, phenolics, vinyl, chloroacetates, furanes, polystyrenes, vinylidene chloride, polyethylene, chloroprene, and styrene rubber. If the corrosion engineer will learn the basic potentialities and limitations of these ten materials, he will be less vulnerable to over-enthusiastic sales claims. Furthermore he will be in a better position to select that material best suited for his particular purpose, to judge quality in the application job, and to recognize limitations in its ultimate use.

Fortunately it is not even necessary for the corrosion engineer to learn ten different sets of performance data. These ten different materials break down very readily into three groups, and all materials within any one group have many common properties. Thus, natural rubber, chloroprene and styrene rubber may be called the rubbers group and all of these materials have the common property of resiliency, extensibility and elasticity. Within this group it is only necessary to remember the distinguishing features between the three members of the group. Similarly the phenolics and furanes will constitute a group of thermosetting materials, and these possess the common properties of hardness, heat-resistance, and inertness to solvents. The remaining materials, the bitumens, vinyls, polystyrenes and polyethylenes, constitute the thermoplastic group and have common properties of relatively low heat-resistance, and solution by certain organic solvents. The corrosion engineer's job is thus simplified to learning the characteristics common to each group—then the characteristics that distinguish the members of each group.

The next logical question is where to obtain the required data on performance and limitations of each of these classes and its members. Frankly the literature on organics for corrosion use is not yet systematically organized for this purpose. Technical Practice Committee No. 6 of the National Association of Corrosion Engineers is now engaged in the project of organizing this available information and presenting it for the ready reference of corrosion engineers. Until such organized information is available, it will be found that manufacturers literature is probably the best source of information, with technical articles and plastic handbooks of some secondary value. I say secondary value because such sources are usually disorganized for our purposes and are not primarily directed to corrosion prevention.

It has been said that any classification such as we suggest, based on generic chemical terminology, can be of little value today in view of the extensive use of proprietary trade names with no indication of the chemical nature. Furthermore, it is pointed out that the store of performance data in the literature is identified by trade name only, and therefore would not be helpful in determining the properties of the chemical class. At first glance this criticism would seem justified, but the use of trade names to obscure the chemical nature of the material is completely ineffective. The very performance data which each manufacturer must give in order to introduce his material will disclose its chemical nature with a high degree of accuracy. Each organic material has identifying resistances,

(*Continued*)

PROGRAM of the chemical industry and protective coatings symposiums, annual meeting of the National Association of Corrosion Engineers, St. Louis, April 4-7.

Chemical Industry. April 5

"The Behavior of the Chromium-Nickel Stainless Steels in Sulphuric Acid," George C. Kiefer and William G. Renshaw, Allegheny Ludlum Steel Corp.

"Corrosion of Metals by Insecticidal Solutions," George S. Cook and Nancye Dickinson, Engineer Research and Development Laboratories, Fort Belvoir.

"Corrosion in Sulphur Production. The Use of an Alloy Protective Coating," N. Hackerman and D. A. Shock, University of Texas.

"Corrosion of Metals in Fluorine and Hydrofluoric Acid," G. C. Whitaker, Harshaw Chemical Co.

Protective Coatings. April 6

"Surface Preparation Values and Sandblasting economics," A. J. Liebman, Dravo Corporation.

"Flame-Sprayed Plastic Coatings," Bernard Goldberg, Schori Process Corp.

"A Progress Report on the use of Cathodic Protection in Conjunction with Protective Coatings," William L. Crosby, Consolidated Edison Company of N. Y.

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A TOUGH CORROSIVE TEAM TO BEAT . . .

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Try this material *first* if you would not be deploring, several failures hence, the apparent lack of a protective coating to meet your standards for fume-resistant surfacing to 750°F.

Not just another aluminum-pigmented paint, Dampney Silicone Coating contains resins sufficient in quantity to impart to it all of the unique heat stability, low moisture absorption and exceptional durability of silicones.

Wherever metal is exposed to continuous heat, or to intermittent heating and chilling — in heavily fume-contaminated atmospheres either sheltered or under severe weather exposures — Dampney Silicone Coating will keep it securely corrosion-free longer.

That it does so at a cost no greater in terms of material, labor and equipment down-time than you may now be paying for considerably less resultful performance is a plus value to be realized in this product of Dampney Maintenance for Metal.

When you have all the facts about Dampney Silicone Coating, we believe you'll want us to quote on your specific applications. Why not give us the details now – when you're writing for Bulletin 1570.

100-1 MAINTENANCE FOR METAL
THE DAMPNEY COMPANY OF AMERICA
HYDE PARK, BOSTON 36, MASS.

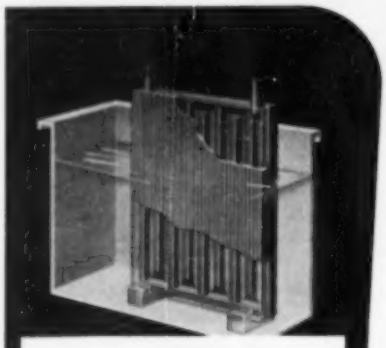
lack of resistances, temperature tolerances and physical features which will completely identify its nature. For example, members of the thermosetting group are usually indicated by the fact that they may be used safely above 275 deg. F. This fact in general indicates that we are dealing either with a phenolic or furane. (Silicones might be indicated, but these can be later identified.) If the literature also states that these materials are completely resistant to the common organic solvents, have excellent resistance to all non-oxidizing acids, and yield a hard, tough, smooth finish, it is further confirmation of phenolics or furanes. The distinction between these two materials can be made through the lack of alkali resistance of the phenolics. All of the other organic materials in common corrosion use can be similarly and conclusively identified according to their peculiar properties.

Step 2—Beware Thin Films

Almost all of the organic materials may be applied in films and linings of various thicknesses. It is in this connection that probably one of the greatest misunderstandings in the use of organic materials is made. Organic materials in thicknesses approximating that of a heavy paint film are available, and their applied cost is considerably lower than heavier films and linings. It is often argued that, inasmuch as the material is entirely resistant to a specific corrosive, a thin film will be fully as effective as a heavy film. One must never forget, however, that unavoidable imperfections in lining applications will usually expose base metal when thin films are used, but an equivalent imperfection in a coating ½ in. thick will not deny full protection. Furthermore it must be realized that during use all coatings and linings are liable to accident or mechanical injury, and a thin film obviously is more easily fractured by such injury than a heavier resilient film. For these reasons, and in spite of the fact that the material itself may be resistant, thinner films should only be used wherever the corrosive action is mild. Thin films are suitable where the main idea is to prevent product contamination by metals, or in combination with cooperative anti-corrosion measures such as cathodic protection or inhibitors. But wherever chemical corrosion is severe and where the likelihood of mechanical injury is predominant, linings of a minimum

(*Continued*)

IMPERVITE



Even Nitric Hydrofluoric Can't Hurt 'em

impervious graphite
PLATE HEATERS
resist the
TOUGHEST CHEMICALS

● The fullest meaning of "impervious" applies to the resin-impregnated graphite from which IMPERVITE heaters are made. Years of continuous use, even with tough Nitric-Hydrofluoric solutions, leaves IMPERVITE unaffected. Simply assembled with standard basic plates, to desired capacity. Easily adapted or expanded. Highly resistant to mechanical or thermal shock. Adaptable for heating or cooling . . . Also IMPERVITE cascade coolers, towers, heat exchangers; stock or special.

Write for our detailed illustrated spec. sheets

Falls Industries, Inc.
AURORA ROAD - SOLON, OHIO

All that Glitters is not GOLD

"The Art of Alchemy"

. . . and by the same token other protective coatings do *not* possess the quality of Insul-Mastic. The outstanding quality, the resistance to corrosion and the durability of Insul-Mastic protective coatings are inherent in our patented formulae and *cannot* be *duplicated* by others.

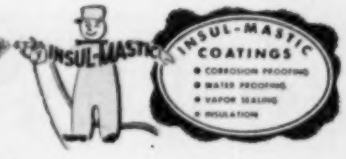
Insul-Mastic protective coatings can solve your corrosion problems and topple your maintenance costs as they have for other great industries.

These industries proved to themselves *through long and careful testing of Insul-Mastic* that it established new, high standards for protective coatings. In all these tests the acid, alkali and moisture resistance, and durability of Insul-Mastic far exceeded all expectations.

Insul-Mastic has enabled these companies to greatly strengthen their coating specifications.

Give Insul-Mastic the acid test yourself. **Let us send you a sample on a steel test paddle to be placed in your most corrosive atmosphere. The results will prove that there is only one Insul-Mastic . . . though others may resemble it as the old alchemist's gold resembled real gold.**

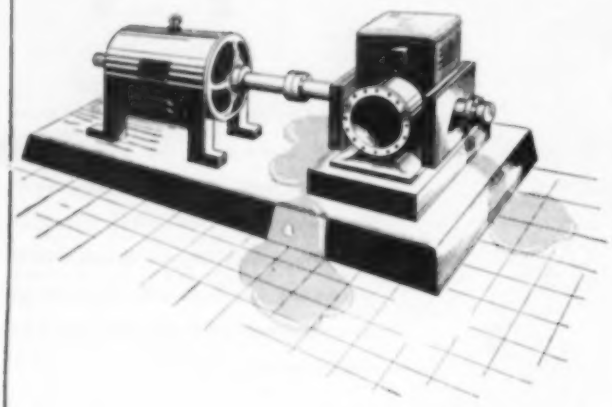
Insul-Mastic Corporation
OF AMERICA
OLIVER BUILDING • PITTSBURGH 22, PENNSYLVANIA



Representatives in Principal Cities

POSITIVE PROTECTION

FOR CONCRETE PUMP-PADS



SPILLAGE OF CORROSIVE MATERIALS ON CONCRETE PUMP-PADS PRESENTS A SERIOUS MAINTENANCE PROBLEM

ATLAS ALKALOY 550 COATING

SOLVES THE PROBLEM

"Alkaloy 550" sets through chemical change into a superior corrosion resistant finish . . . a finish as hard as tile.
Write us at 10 Walnut St., Mertztown, Penna., for Bulletin 7-1. . . . No obligation.

THE ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNA. HOUSTON, TEXAS

Corrosion Proof LININGS	Corrosion Proof CEMENTS	Corrosion Proof COATINGS	Corrosion Proof FLOORS	Corrosion Proof TANKS

thickness of ¼ in. should always be used.

STEP 3—MAKE YOUR OWN TEST PANELS

It is advisable to test the suitability of various organic linings and coatings proposed for protection before standardization. In such cases, preliminary elimination may be conducted in the laboratory, but final evaluation should always be conducted in the operating process equipment which is to be protected. In such cases avoid use of the test panels or rods which are in current use by coating manufacturers. These rods have nicely rounded ends and edges, and cannot possibly indicate more than chemical resistance of the coating composition. They give no indication of whether or not such a coating or lining can be satisfactorily applied to the equipment. Furthermore the coating is applied under laboratory conditions, usually by dipping, which tends to give an application superior to that which can be obtained in actual applications. For such testing, therefore, it is desirable to design a steel test panel which will incorporate all of the features and irregularities, such as welds, edges, cavities, inside and outside corners, as they exist in the equipment to be protected. This test panel should then be coated exactly as the actual application will be carried out.

Too often coating or lining applications designed for severe corrosion service and for protection of expensive equipment are put into service without adequate acceptance testing of the quality of the application. Inexpensive electrical and chemical tests are available by which the serviceability of any coating or lining can be determined and imperfections detected. These should be specified and used.

STEP 4—AVOID "EASY" SURFACE PREPARATION

Much has been said of the importance of surface preparation before application of the coating or lining. Other than to stress again the importance of this point, I would say only that whenever there is any question, sand or shot blast. The new priming systems, especially the wash primers, have advanced the technology a long way in securing proper adhesion and coverage of difficult surfaces. Keep in mind that no such film system is foolproof however, and until further experience is available with these primers, use them in addition to, not instead of, good surface preparation.

(Continued)

need help with your

CORROSION *problems?*

— let Tri-Clover SPECIALIZED EXPERIENCE lend a hand . . .

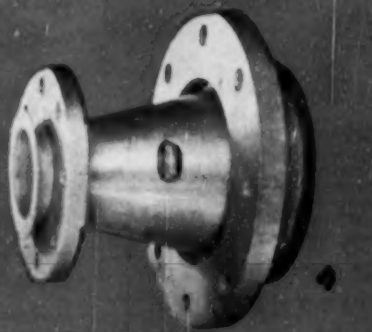
USE THE RIGHT FITTING TYPE FOR EVERY JOB . . .

It will pay you to take advantage of Tri-Clover's 30 years of specialized experience in solving the most difficult corrosion problems. Having a *complete* line of stainless steel and nickel alloy fittings, valves and pumps to choose from, Tri-Clover engineers are able to recommend *exactly* the right type and size to meet your conveying line needs. If you prefer, send us a sample of your product for laboratory tests and we will furnish complete recommendations covering the type of corrosion-resistant fittings and lines best suited for your use. Illustrated are four typical Tri-Clover fitting types:

1 Assembled section of Flanged Conical-End Fitting showing IPS adapter. Available in a complete line, 1" thru 4" O.D.

2 World-famous Tri-Clover Sanitary Fittings and Valves are available in a complete line of stainless steel and nickel alloy types, 1" thru 4" O.D. for all sanitary code requirements.

3 Recessed-End Fittings . . . easily assembled by soldering, brazing or socket welding. Available in a complete line, ¾" thru 10" O.D.



4 Typical "Zephyrweld" Welding Fitting Reducer with Van Stone welding nipples and slip-on flanges for easy, fast assembly. Available in a complete fitting line, from ¾" thru 24" O.D.

NOW AVAILABLE—Complete Line of Stainless Pipe & Tubing—full size range, all popular analyses.

Tri-Clover
MACHINE CO.
Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

TRI-CLOVER

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

Little filtration faults can make costs BIG

"Visiting with the filter operator, certain practices were noted which certainly did contribute toward high turbidities. Most notable was shutting off the feed to a press after this press was almost spent, and allowing the press to drain. According to the filter operator, when the feed is again turned on at high pressure they get a very substantial flow. It is plain to see that shutting off the feed allowed the cake to drop, and when they turned on the feed again they naturally got a temporary high flow, because it would be the same as pre-coating on a fresh cloth.

"This plant also starts the filter presses on gravity feed. In this connection two bad practices were noted. First, if they do not need the filter right away it is allowed to drizzle at a very low flow, probably allowing some settling of filteraid. Second, when they do turn over to the pump feed, their practice is to shut off the gravity feed before turning on the pump feed. This, of course, makes it possible for the filter cake to fall off, or at least be disturbed.

"Mr. _____ did not know of these faults, and now feels sure that when they are corrected, their troubles will be cured."

(FROM REPORT OF A DICALITE ENGINEER)

keep costs thrifty in '50 . . . USE DICALITE* FILTERAIDS

SEND FOR YOUR COPY . . .
. . . of this Dicalite Technical Service Bulletin B-12. Covers fundamentals of filtration and describes ways to secure best results from diatomaceous filteraids. Sent without charge.

DICALITE FILTERAIDS

*Reg. U.S. Pat. Off.

If you feel your filtration costs are getting out of hand, or if you feel that operating efficiency is low—why not call in a Dicalite Engineer? Perhaps you have "trouble," such as low flow rates, unsatisfactory clarity, or haze or bacteria that defies removal. From wide experience he can recommend the most suitable grade of Dicalite filteraid for the job; he can also check your present procedure for any change to improve efficiency and reduce costs. Telephone or write the Dicalite office nearest you for prompt action.

DICALITE DIVISION, GREAT LAKES CARBON CORPORATION

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Names in the News

MAN OF THE MONTH

Sir Frederick Bain, M. C.

Last month Sir Frederick Bain, M. C., deputy chairman of Imperial Chemical Industries, Ltd., spoke in New York before the Society of the Chemical Industry. The breadth of his topic, "The Shape and Development of the Chemical Industry," reflects the scope of his own wide experience. As chairman of the Anglo-American Council on Productivity, he was especially qualified to address an audience of American industrialists.

The Council was formed in 1948 to help British industry raise its level of productivity through the study of American industrial organization, method and technique. In the United Kingdom's section, the supervisory, technical and workshop levels of industry are represented by its member organizations: the Federation of British Industries (of which Sir Frederick is past president), the British Employer's Confederation (of which he is a vice president) and the Trades Union Congress. Investigating teams sent to this country are made up of members of all three organizations. One team's findings has recently been published in a report titled "Simplification in Industry" which gives evidence of benefits gained by American industry from a policy of reduction of variety of products manufactured within a plant.

Another of Sir Frederick's interests is the Association of British Chemical Manufacturers, of which he is vice chairman. This group, too, has recently published a "Report on the Chemical Industry, 1949" —a comprehensive survey of the whole British chemical industry. It sets out to clarify ". . . the relationship of chemical manufacture to other industries, the interrelationships between different sections of the industry and the impact of continuous progress and new scientific knowledge on chemical developments. . ."

Sir Frederick Bain was born on March 22, 1889, a son of the late James Bain of Macduff, Benffshire, Scotland. He studied at Macduff, Bauff Academy and Aberdeen University. In World War I he served as Captain 4th Gordon Highlanders, was wounded twice and received the Military Cross. He was deputy director Chemical Warfare Supply, Ministry of Munitions, 1916-1918.

From 1941-1944 he was chairman of the Chemical Control Board, Ministry of Supply and in 1942-1944 chairman of the Chemical Planning Committee, Ministry of Production.

Among his other activities have been the Ministry of Pensions Artificial Limbs Committee 1945; Board of Trade Committee on Management 1945; National Production Advisory Council on Industry; National Joint Advisory Council, Ministry of Labor; Committee on Civil Service Remuneration. He is a director of the Royal Insurance Co., and the Liverpool & London & Globe Insurance Co., Ltd. He was created a Knight in 1945.

John H. Lux has been appointed manager of the new product development laboratory of the General Electric Co. chemical department in Pittsfield, Mass.

James A. Lee, *Chemical Engineering's* Southwest editor, has been elected secretary of the South Texas section of the American Institute of Chemical Engineers.

Oswald T. Zimmerman has been named head of the newly-formed chemical engineering department at the University of New Hampshire, Durham. A specialist on synthetic resins and hydraulic cements, Dr. Zimmerman has been with the chemistry department of the university since 1938.

William B. Moore, Jr., has joined Reynolds Metals Co., Louisville, Ky., as a technical service engineer.

L. J. Sverdrup has been made chairman of a three-man engineering advisory committee to assist the Idaho Operations office, U. S. Atomic Energy Commission, on the planning and development of the Reactor Testing Station. Other members of the committee are **H. M. Crothers** and **W. W. Horner.**

H. L. Trentham has been transferred by Fish Engineering of Houston, Tex., to Cisco Hydrocarbon Corp., Cisco, Tex. He has been made operating vice president.

Jerry McAfee, formerly on the staff of the Port Arthur Refinery of Gulf Oil Corp., has been appointed director of the chemistry division of Gulf Research & Development Co. in Pittsburgh.

G. L. Pitzer, former area supervisor of the Vinylite area of the Carbide & Carbon Chemicals division at Texas City, Tex., has become assistant superintendent in charge of all production of Vinylite resins.

Walter M. Scott, director of the Southern Regional Research Laboratory at New Orleans, La., has been appointed assistant chief of the U. S. Department of Agriculture's Bureau of Agricultural and Industrial Chemistry. **Charles H. Fischer** succeeds Dr. Scott in New Orleans.

Richard D. Jolls has been made gas process engineer for Gas Machinery Co. of Cleveland, Ohio.

Frank G. Breyer of Singmaster & Breyer has been voted an honorary membership in the American Institute of Chemists, New York.

F. G. Breyer

J. W. Huff

Jesse W. Huff has been named director of biochemical research for Sharp & Dohme, Inc., Philadelphia. He was formerly assistant director.

Samuel M. Weisberg has been appointed director of the division of general chemistry of National Dairy Research Laboratories, Inc., Oakdale, N. Y.

Merle J. Graham has been appointed manager of production for Allegheny Ludlum Steel Corp., Pitts-

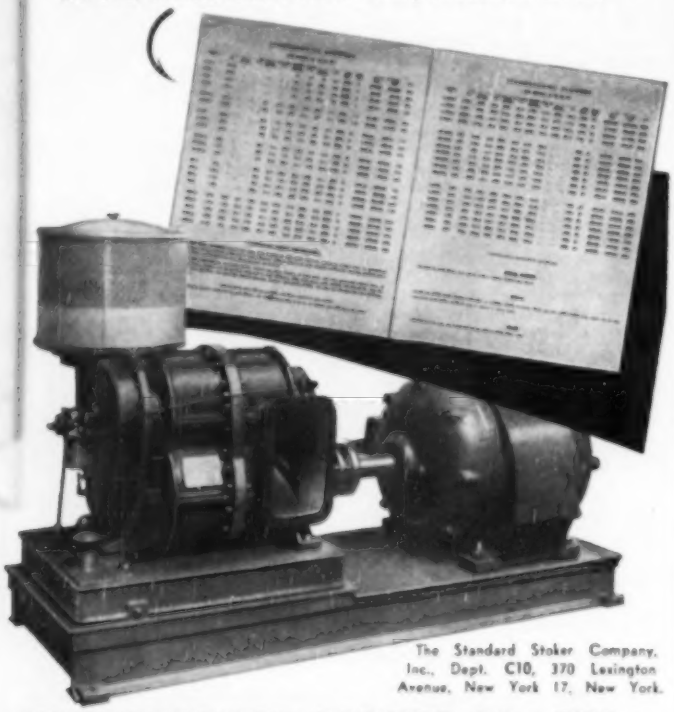
(*Continued*)

The STANDARDAIRE
PRECISION BUILT
Axial Flow BLOWER

To meet specific and variable pressures, Standardaire Positive Displacement Blowers are built in a series of sizes to fulfill a wide range of capacity requirements from directly connected, standard speed motors—the modern method of producing just the amount of air required at the minimum cost. Direct-drive motor speeds also provide for an even air flow resulting in smaller pulsations that are easy to dampen out and do not create shock loads in the blower or delivery system. If the type of service demands other than direct drive, a pulley attachment can be readily applied to the blower for particular specifications.

The flexibility of speed and pressure possible with the Standardaire Blower eliminates a great number of blower types normally required in the positive displacement field—a desirable engineering advancement in blower design without disturbing fundamental principles.

For full information and a complete list of blower sizes, write for Standardaire Selection Chart, Publication No. 86.



The Standard Stoker Company, Inc., Dept. C10, 370 Lexington Avenue, New York 17, New York.

THE STANDARD STOKER CO • INC •

Standard Stoker SSC

NEW YORK • CHICAGO • ERIE • MONTREAL

NAMES IN THE NEWS, *cont. . .*

burgh, Pa. **Frank G. Benford** succeeds him as plant manager.

Robert F. Mehl, director of Carnegie Institute of Technology's metals research laboratory and head of the metallurgical engineering department, has been named chairman of the committee on metallurgy of the research and development board, National Military Establishment, Washington, D. C.

Paul Kendall has been elected president of Sharples Chemicals Inc., Philadelphia. He succeeds **P. T. Sharples** who has been named chairman of the board. **Lee H. Clark** has replaced Mr. Kendall as executive vice president.

P. Kendall L. H. Clark

Charles B. Durgin has been made associate director of Monsanto Chemical Co.'s phosphate division research department in Anniston, Ala. **Henry V. Moss, Edgar E. Hardy** and **C. H. Aall** have been made assistant directors.

R. C. Swain, vice president of the American Cyanamid Co., Stamford, Conn., has been appointed chairman of the committee on chemical warfare of the Research and Development Board, Department of Defense.

Robert L. Grun has been appointed chief fuels and lubricants engineer, process oil section, industrial products engineering, Gulf Oil Corp., Pittsburgh, Pa.

David C. Hull has been appointed by Tennessee Eastman Corp., Kingsport, Tenn., to head the newly organized Texas division to carry on operations at the new plant to be constructed at Longview, Texas. **H. H. Imray, Jr.,** has been appointed assistant division manager; **W. R. Saunders,** superintendent of manufacturing operations; **W. R. Burton,** superintendent of engineering and services; and **S. W. Sayre,** division comptroller. At Kingsport, **C. C. Hyatt, Jr.,** has succeeded

Mr. Hull as superintendent of the acid division; **Edwin S. Painter** replaces Mr. Saunders as head of the acetic anhydride department.

Carlton H. Rose, head of the National Lead Co.'s specification department, has been appointed representative of the American Society for Testing Materials on the Standards Council of the American Standards Association.

Carl E. Miller has been appointed to the engineering staff of the industrial department, Combustion Engineering Superheater, Inc., New York. He was formerly technical advisor in research and development of fuels at Battelle Memorial Institute.

George Peterson, Jr., has been appointed manager of the special products division, Riverside Metal Co., Riverside, N. J.

H. E. Thompson, vice president and chief engineer, Carbide & Carbon Chemicals Corp., has been nominated a candidate for the presidency of the Chemists' Club, New York, for the year 1950-1951.

Louis Koenig has been appointed assistant director of research at Stanford Research Institute, Stanford, Calif. He will have charge of Institute activities in chemistry, chemical engineering, metallurgy, applied biology, food technology and pharmacology. **Clark E. Thorp** succeeds Dr. Koenig as chairman of chemistry and chemical engineering research at Armour Research Foundation of Illinois Institute of Technology, Chicago.

L. Koenig

C. E. Thorp

Milton F. Beecher has been elected vice president in charge of research and development by the Norton Co., Worcester, Mass.

Erle M. Billings has resigned as secretary of the American Chemical Society's committee on professional training. The new secretary is **John Howard**, Eastman Kodak's

(Continued)

LEE MATERIAL HANDLERS

The Industry's Most Important Development

SAVES TIME, MONEY AND COSTLY MANPOWER

LEE Materials Handler dumping 500 lb., 54 gallon barrel of preserves in 4 ft. high kettles. Other models for specific jobs. Write for Bulletin LM-13.

LEE METAL PRODUCTS CO., INC.
417 PINE STREET, PHILIPSBURG, PA.

ALL LEE KETTLES ARE MADE TO A.S.M.E. CODE

MACHINED ENDS *Assure* Perfect Welding

***FLOWLINE* STAINLESS STEEL WELDING FITTINGS . . .**
for All Corrosion-Resisting Applications

It is possible to construct any stainless piping system with a minimum of equipment, using *FLOWLINE* fittings, simply by straight cutting of tubes, and plain butt welding. The ends of all *FLOWLINE* fittings are accurately machine tool cut—fittings of wall thickness over .083" are beveled to 37½° with approximately 1/16" straight face; those with wall thickness of .083" or lighter are cut straight, not beveled. Consequently, fitting time is minimized, and faster, uniformly sound welds are assured.

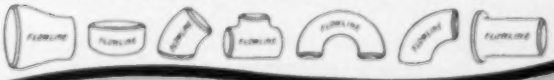
These fittings, manufactured in Stainless Types 304, 316, and 347, are available to match pipe and tubing of various wall thicknesses in sizes from ¾" through 12". They are annealed, cleaned, and passivated for maximum corrosion resistance.

The Most Complete Line of Stainless Steel Welding Fittings

WELDING FITTINGS CORP.
NEW CASTLE, PENNSYLVANIA
Formerly Stainless Alloy Division - Pittsburgh Piping and Equipment Co.

Send for Bulletin S-310

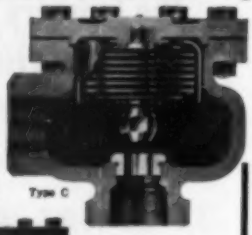
World's Largest Manufacturer of Stainless Steel Welding Fittings



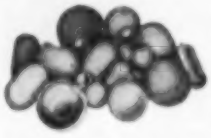
Leading Processor

SHORTENS OPERATION from 65 to 45 Min.

with Nicholson Steam Traps



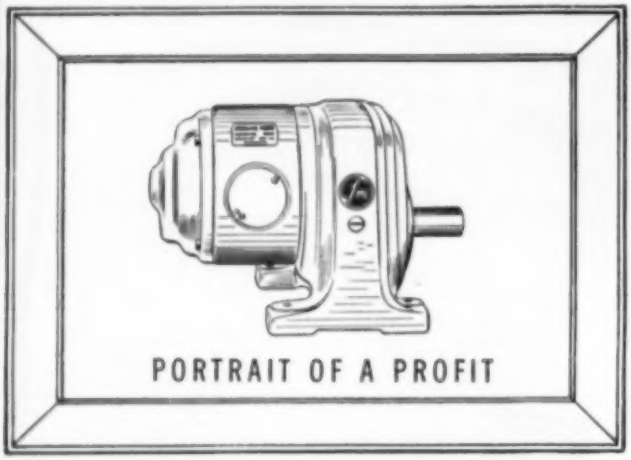
Records of a recent installation of Nicholson steam traps, by a large food packer, shows they cut cooking time 30%; e.g., one operation was shortened from 65 to 45 min. Nicholson units keep equipment full of live steam because: 1) they operate on lowest temperature differential: 2) have 2 to 6 times average drainage capacity. Also record low for steam waste; and maximum air-venting capacity. Widely specified for preventing damage to thin gauges; eliminate cold blow in unit heaters.



5 TYPES FOR EVERY PURPOSE—Size ¼" to 2"; press. to 225 lbs. **BULLETIN 1047.**

HIGH-PRESSURE FLOATS—Stainless, monel, steel or plated steel. Welded. In all sizes and shapes; for operating mechanisms and as tanks or vessels. 2-day delivery. **BULLETIN 348.**

W. H. NICHOLSON & CO., 206 Oregon St., Wilkes-Barre, Pa.



For greater profits, use Sterling Slo-Speed Electric Power Drives

STERLING
ELECTRIC MOTORS

PLANTS: NEW YORK 51, LOS ANGELES 22, HAMILTON, CANADA—OFFICES IN PRINCIPAL CITIES
Write for Bulletin
SLO-SPEED (Geared) • SPEED-TROL (Variable Speed) • KLOSD (Normal Speed)

business and technical personnel director.

George M. Hartley has been appointed manager of the General Electric Co.'s glyptal alkyd resin plant in Schenectady, N. Y.

C. S. Parke was elected to the newly created post of executive vice president of Harshaw Chemical Co.

Frank C. Haas has been named vice president of Werner G. Smith Co. of Cleveland, Ohio, a division of Archer-Daniels-Midland Co., Minneapolis. **Walter F. Platt, Jr.,** director of eastern division sales has been promoted from assistant vice president to vice president. He will continue to maintain his office in Philadelphia.

C. B. Robinson has retired from his position as vice president of Wyandotte Chemicals Corp. in charge of the J. B. Ford division.

Carlos Gonzenbach has joined the technical staff of the Pennsalt International Corp. to assist consumers in South and Central America.

Kenneth G. Jobson, manager, cylinder maintenance and testing department of the Linde Air Products Co., New York, has been elected president of the Compressed Gas Association.

Max A. Trechsel, formerly with Wood Sugar Ltd., has joined the Ateliers de Constructions Mecaniques S. A., Vevey, Switzerland.

Maurice W. Daugherty has been made secretary of the Aluminum Research Laboratories, New Kensington, Pa., for the Aluminum Co. of America.

Fred Belcher has been named Atomic Energy Commission manager in Dayton, Ohio.

Howard F. Bjork has been made manager of the Wyandotte, Mich., plant of Sharples Chemicals Inc., Philadelphia. **Robert P. Ogden** succeeds him as production manager. **J. W. Mayers** has been appointed chief engineer.

Herman Levin has been added to the staff of Southwest Research Institute of Houston and San Antonio.

F. W. Fraley, R. W. Hooker and **S. W. Jacobs,** vice presidents of Diamond Alkali Co., Hooker Electrochemical Co., and Niagara Alkali

Co. respectively, have been elected directors of the Chlorine Institute, New York.

C. J. Marlett, formerly representative for Kennametal Inc. in the Chicago district, has been transferred to their engineering department at Latrobe, Pa.

W. A. Raimond has been made departmental technical director for dyes in the Calco Chemical Division of the American Cyanamid Co., Bound Brook, N. J. **W. P. Munro** has been made chief chemist of the dyes manufacturing division.

W. A. Raimond

A. B. Lamb

Arthur B. Lamb, professor emeritus of Harvard University and editor of the *Journal of the American Chemical Society*, has been made a director of Ionics, Inc., Cambridge, Mass.

Warren Oakes, president of the Fleischmann Distilling Corp., has been elected president of the Distilled Spirits Institute, Inc., Washington, D. C.

Stanley Halley has been made assistant production manager for Sandoz Pharmaceuticals, New York.

Eric R. Kent of the research and development department, Socony-Vacuum Laboratories, Paulsboro, N. J., has been selected to receive the 1950 incentive fellowship award of the Socony-Vacuum Oil Co. for advanced study.

Arleigh A. Burke has been appointed Navy Secretary of the research and development board, Department of Defense.

Robert E. Good has been named assistant works manager of the Hercules Powder Co. works at Jasonville, Ind.

Laurence Andrew has been appointed manager of the pipeline department of General Petroleum Corp. **V. C. Larsen** has been made general super-

(Continued)

SNAKE-LIKE BENDS, HEADERS, ETC. in PRE-FABRICATED *Stainless* PIPING

There's nothing a snake can do—coil, curl or poise—that we can't do with stainless steel piping. We have the experience and facilities to handle stainless steel for the most complicated bends, headers, etc. on both large and small jobs. Pre-fabricating stainless steel piping is a most exacting business and requires "know-how" so the stainless retains its original characteristics after numerous metallurgical treatments. More than 20 years ago, we pioneered in developing methods for welding and shop pre-fabrication of stainless piping and now use the latest "inert-gas-shielded-arc" method. Our 50 years' experience has given us the "know-how" of power and processing piping and, today, most utilities know the perfection of our patented Westport Welded Joint. Send us your prints for an estimate.

WESTPORT JOINT

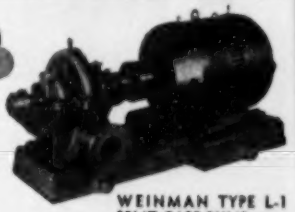
REPRESENTATIVES IN BOSTON, NEW YORK, CLEVELAND, MOBILE AND HAVANA

W. K. MITCHELL & CO., INC.
2040 ELLSWORTH STREET
PHILADELPHIA 46, PA.

MITCHELL

PIPING FABRICATORS AND CONTRACTORS

handle liquids profitably with WEINMAN PUMPS



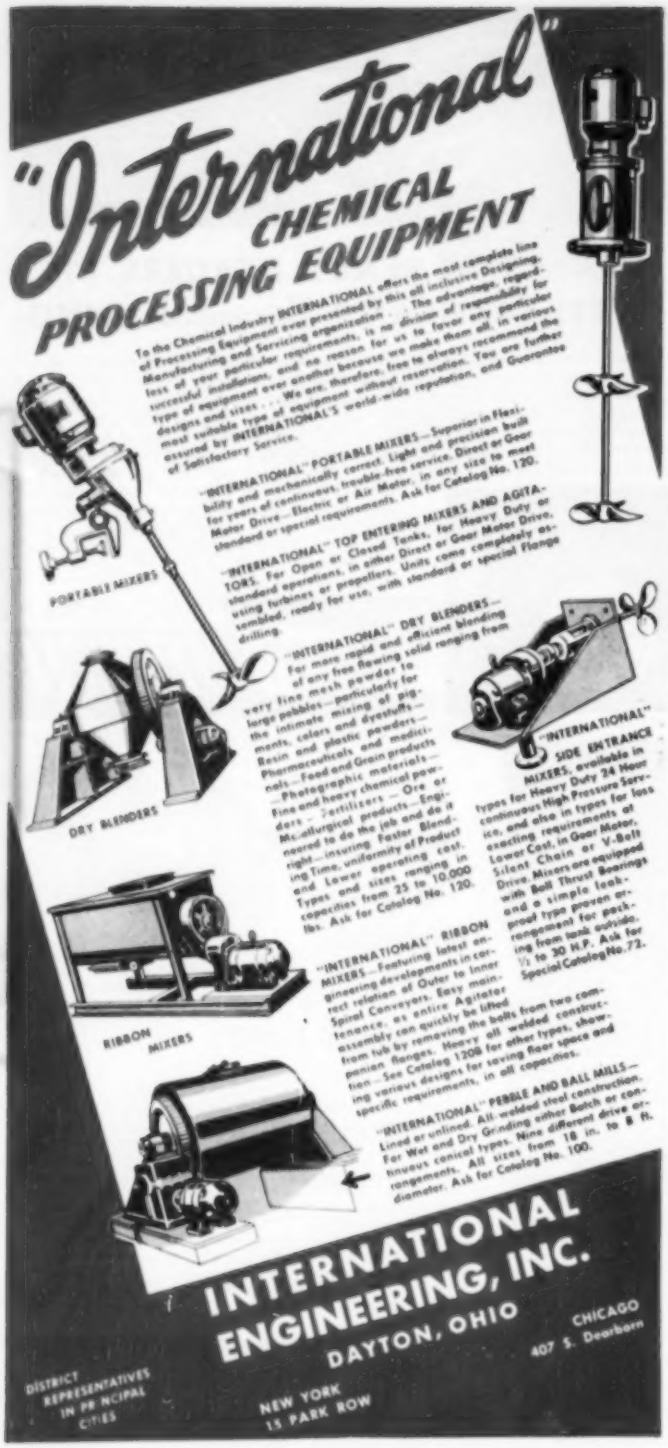
WEINMAN TYPE L-1 SPLIT-CASE PUMP combines all the most desirable features of modern hydraulic and mechanical design. Capacities to 3500 G.P.M.

The Chemical industry operates profitably *only* if production equipment keeps turning out a full day's work at maximum efficiency—every day—at a minimum over-all cost. That's why you find so many WEINMAN Pumps on the job in Chemical Processing. Let a WEINMAN Centrifugal Specialist show how you can cut your liquid handling costs and assure your plant day-in, day-out, trouble-free pumping service. Most WEINMAN models and sizes are available in All-Bronze, All-Iron, All-Nickel, All-Aluminum and All-Stainless Steel construction. Your inquiry—by letter, wire or phone—will get prompt attention from a WEINMAN specialist—a CAREER MAN IN PUMPS.

Built by Centrifugal Specialists

The WEINMAN Pump Mfg. Co.

300 SPRUCE STREET • COLUMBUS 15 • OHIO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CHEMICAL
PROCESSING EQUIPMENT
To the Chemical Industry INTERNATIONAL offers the most complete line of Processing Equipment ever presented by this all inclusive Designing, Manufacturing and Servicing organization. The advantage, regardless of your particular requirements, is no division of responsibility for successful installations, and no reason for us to favor any particular types of equipment over another because we make them all, in various designs and sizes. We are, therefore, free to always recommend the most suitable type of equipment without reservation. You are further assured by INTERNATIONAL'S world-wide reputation, and Guarantee of Satisfactory Service.
"INTERNATIONAL" PORTABLE MIXERS—Superior in Flexibility and mechanically correct. Light and precision built for years of continuous, trouble-free service. Direct or Gear Motor Drive—Electric or Air Motor, in any size to meet standard or special requirements. Ask for Catalog No. 120.
"INTERNATIONAL" TOP ENTERING MIXERS AND AGITATORS. For Open or Closed Tanks, for Heavy Duty or standard operations, in either Direct or Gear Motor Drive, using turbines or propellers. Units come completely assembled, ready for use, with standard or special Flange drilling.
PORTABLE MIXERS
"INTERNATIONAL" DRY BLENDERS—For more rapid and efficient blending of any free flowing solid ranging from very fine mesh powder to large pebbles—particularly for the intimate mixing of pigments, colors and dyestuffs—Resin and plastic powders—Pharmaceuticals and medicinals—Food and Grain products—Photographic materials—Fine and heavy chemical powders—Fertilizers—Ore or Metallurgical products—Engineered to do the job and do it right—insuring Faster Blending Time, uniformity of Product and Lower operating cost. Types and sizes ranging in capacities from 25 to 10,000 lbs. Ask for Catalog No. 120.
DRY BLENDERS
"INTERNATIONAL" SIDE ENTRANCE MIXERS, available in types for Heavy Duty 24 Hour continuous High Pressure Service, and also in types for less exacting requirements at Lower Cost, in Gear Motor, Silent Chain or V-Belt Drive. Mixers are equipped with Ball Thrust Bearings and a simple leak-proof type proven arrangement for packing from tank outside. ½ to 30 H.P. Ask for Special Catalog No. 72.
"INTERNATIONAL" RIBBON MIXERS—Featuring latest engineering developments in correct relation of Outer to Inner Spiral Conveyors. Easy maintenance, as entire Agitator assembly can quickly be lifted from tub by removing the bolts from two companion flanges. Heavy all welded construction—See Catalog 1208 for other types, showing various designs for serving floor space and specific requirements, in all capacities.
RIBBON MIXERS
"INTERNATIONAL" PEBBLE AND BALL MILLS—Lined or unlined. All welded steel construction. For Wet and Dry Grinding either Batch or continuous conical types. Nine different drive arrangements. All sizes from 18 in. to 8 ft. diameter. Ask for Catalog No. 100.
INTERNATIONAL ENGINEERING, INC.
DAYTON, OHIO
CHICAGO
407 S. Dearborn
NEW YORK
15 PARK ROW
DISTRICT REPRESENTATIVES IN PRINCIPAL CITIES

intendent and **H. T. Williams** northern division superintendent at Taft, Calif. **C. W. House** has been named southern division superintendent, Vernon, Calif.

Max I. Alimansky has been appointed assistant to the manager of engineering of the General Electric transformer and allied product divisions at Pittsfield, Mass.

Chandler T. White has been elected vice president of General Aniline & Film Corp., New York. He will continue as general manager of the General Aniline Works (dyestuffs) division.

C. T. White

E. A. Ulrich

Edward A. Ulrich has been elected a vice president of Niagara Filter Corp., Buffalo, N. Y. He will continue to hold his position as technical director.

Paul J. Harrington has been made assistant chief engineer in the Esso engineering department of Standard Oil Development Co.

James H. Binger has been elected vice president and general manager of the Belfield valve division, Philadelphia, of Minneapolis-Honeywell Regulator Co.

Joseph H. Reid has been made general manager of the titanium division of National Lead Co., New York.

Stephen A. Sloan has been made manager of research and development for Peabody Engineering Corp., New York.

William D. Appel, head of the textile section of the National Bureau of Standards, has been elected a fellow of the Textile Research Institute.

Maurice du Pont Lee has retired from his position as general advisor to the chief engineer of the DuPont Co., Wilmington.

Richard D. Dunlop has been ap-

pointed assistant general manager of the Texas division of Monsanto Chemical Co. at Texas City.

George R. Mitchell has been awarded a Firestone fellowship at Case Institute of Technology for study in organic chemistry.

Ralph E. Layman has been appointed technical director of the Voltax Co., Bridgeport, Conn.

Donald W. Beery has been appointed senior engineer in the synthetic fuels and chemicals department, chemical plants division, Blaw-Knox Co., Pittsburgh, Pa.

V. J. Calise has been named technical director of Graver Water Conditioning Co., New York.

Allen Adkins and **Lawrence Beauregard** have joined the staff of Harris Research Laboratories, Washington, D. C.

Lyndon Frederick Small, head chemist of the National Institutes of Health, Bethesda, Md., has been awarded the 1950 Hillebrand Prize of the Washington section of the American Chemical Society.

L. W. Alberts has been appointed manager of the chemical plants division of Blaw-Knox Co., Pittsburgh, Pa.

L. W. Alberts

F. G. Sawyer

Frederick G. Sawyer has resigned from his position as the American Chemical Society's associate editor, in San Francisco, of *Industrial & Engineering Chemistry* and *Chemical & Engineering News*. He has joined Stanford Research Institute, Stanford, Calif., to take part in the administration of the institute's air and water pollution program.

Huntly M. Campbell, formerly sales manager of the mill products division, Western Brass Mills, East Alton, Ill., has been made sales manager of both mill and fabricating products for the western division. **E. N. Rousseau** has been made sales manager of mill and fabricat-

(*Continued*)

FILTER UNITS by MULTI-METAL

The illustrated filter cylinder, made of stainless steel wire cloth over carbon steel skeleton, is one example of Multi-Metal's "know-how" in the design and fabrication of filter cloth assemblies. The versatile ability to produce such intricate units is a natural result of 35 years of specialization in the wire and filter cloth field. That is why Multi-Metal fabricated filter units are so widely used in the processing industries to speed up production, increase equipment life, cut maintenance expense, and protect product purity.

Multi-Metal stocks a large variety of filter and wire cloth of all meshes, weaves and metals supplied by the yard, piece or roll. Send for wire cloth samples and catalog describing Multi-Metal's complete fabricating facilities. Include your prints and specifications for prompt quotations.

More than 35 years of service to process industries

Multi-Metal
WIRE CLOTH COMPANY, INC.
1350 Garrison Ave., New York 59, N. Y.

ALLMETAL'S

NON-CORROSIVE Stainless Fittings and Fastenings

AVAILABLE IMMEDIATELY

In the chemical industry, it's Allmetal's stainless fittings and fastenings for resisting acid, rust, corrosion! Non-sparking, non-magnetic, re-usable, easy to clean, longer-lasting . . . available in all analyses and sizes from America's largest stock. Specials to order.

WRITE, ON YOUR LETTERHEAD, FOR CATALOG A49

STAINLESS STEEL FASTENERS

MANUFACTURERS SINCE 1929
ALLMETAL Screw Products Co., Inc.
33 GREENE STREET, NEW YORK 13, N. Y.

Sealing Water Flows

USE FILE #39-10

Engineers successfully solidify water bearing sands by special process using "N" Silicate and a reacting chemical. The crushing strength of the compacted mass is high. In one job in 30 minutes it was 16 tons per sq. ft., after several weeks it was 50 tons per sq. ft. The same process is used in foundation excavations, sealing leaking joints in concrete dams and tunnels.

De-inking Waste Paper

USE FILE #6-1

In de-inking papers with soluble silicate the ink is lifted off the fibre and does not re-deposit. Color is outstandingly improved, particularly with ground-wood. In one mill 2.5 % Metso* Granular (1:1) with an equal quantity of caustic produced excellent results even on rotogravure stock, at a saving in chemical cost.

SILICATE P's & Q's

*Reg. U.S. Pat. Off.

For more information on these silicate uses write for the above file numbers.

SOLUBLE SILICATES FOR INDUSTRY

PHILADELPHIA QUARTZ CO.

1123 Public Ledger Bldg., Phila. 6, Pa.

Improved Filtering

(25% greater rate of flow)

(CROSS SECTION)

through the Bottom Drainage Leaves of the

FERGUSON

TUBULAR SLIT SCREEN

Types 304-316 Stainless Steel
All-Welded Construction

Gives you 25% greater rate of flow with LESS PRESSURE than with leaves of wire cloth. An EVEN CAKE over entire surface. Screens are SMOOTH. Filter cloth lies FLAT, reducing bulging, tearing. The BOTTOM DRAINAGE feature is especially useful in chemical processing. Made in all shapes and sizes.

● *We also* specialize in Centrifugal Screens of types 304 and 316 stainless steel with holes as small as .026" dia.

Write for our catalog.

FERGUSON PERFORATING & WIRE CO.

130-140 Ernest St., Providence, R. I.

NAMES IN THE NEWS, cont. . .

ing products in the eastern division.

R. A. Roosevelt has been made sales manager for Eriez Manufacturing Co., Erie, Pa.

George C. Jelliffe has been appointed eastern district manager for the Ilg Electric Ventilating Co. of Chicago.

John W. Wilkinson has been appointed general sales manager of the McKiernan-Terry Corp., with plants at Harrison and Dover, N. J.

Harold M. Parsekian has been named manager of vinyl sales for the Naugatuck chemical division, United States Rubber Co., Naugatuck, Conn.

James P. Stewart has been elected executive vice president of De Laval Steam Turbine Co., Trenton, N. J.

Hugh C. Land has been appointed production manager of Pennsylvania Salt Mfg. Co., Philadelphia. He was formerly assistant to the production manager.

H. W. Regenburger has been appointed chief engineer of the general engineering department of the Link-Belt Co., Chicago, Ill.

D. M. Gerges has been made chief engineer for the Pesco products division of Borg-Warner Corp., Chicago.

Hamnett P. Munger has been appointed to coordinate Battelle Memorial Institute's air pollution research activities and to act in a liaison capacity between Battelle and industry.

Harry S. Thompson has been appointed supervisor of the beta napthol plant of the Hilton-Davis Chemical Co. division in Cincinnati of Sterling Drug, Inc.

Harold A. Edlund has been named director of sales for the Arco Co., Cleveland.

John E. Powell has been re-elected president of the Smith Agricultural Chemical Co., Columbus, Ohio.

Lyman C. Athy has been appointed technical assistant to the president of Pemco Corp., Baltimore.

Sidney Allan Savitt has joined Con-

(Continued)

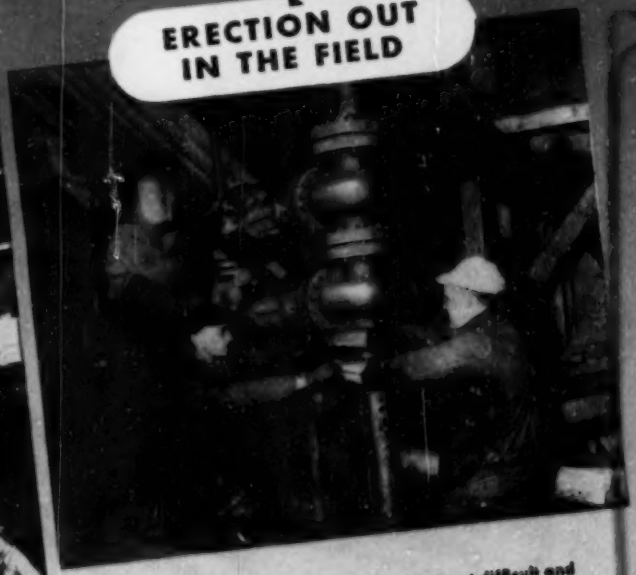
YOU GET BETTER PIPING

because MIDWEST knows piping problems

INSIDE and OUT

PREFABRICATION IN THE SHOP

ERECTION OUT IN THE FIELD



Because Midwest has erected some of the most difficult and exacting piping jobs out in the field, in addition to having prefabricated them in the shops, we have a clear, competent view of piping problems from every angle.

Our Fabricating Department works closely with the Contracting Department . . . continually seeking ways of making their job easier, less costly, and higher in quality. The Contracting Department is always ready to make practical suggestions for improving prefabricated piping subassemblies. It is in constant and intimate touch with piping users in all types of industry. Changes in needs—changes in thinking are quickly relayed to the whole Midwest organization.

The net result to you is better piping whether you want a simple pipe bend . . . a series of complex prefabricated subassemblies . . . or a difficult piping job completely erected.

MIDWEST PIPING SERVICE IS NATION-WIDE

4 PLANTS ARE BETTER THAN 1

PIPING FABRICATORS AND CONTRACTORS

MIDWEST PIPING & SUPPLY COMPANY, INC.

Main Office: 1450 South Second Street, St. Louis 4, Mo.

Plants: St. Louis, Passaic, Los Angeles and South Boston

Sales Offices: New York 7—30 Church St. • Chicago 3—79 West Monroe St.
Los Angeles 33—520 Anderson St. • Houston 2—229 Shell Bldg.
Tulsa 3—533 Mayo Bldg. • South Boston 27—426 First St.

Built by Blaw-Knox . . .

TO MEET THE NATION'S NEED FOR FEED!

CHEMICAL PLANTS DIVISION WAS SELECTED BY PURINA TO DESIGN AND BUILD THIS ENTIRE SOLVENT EXTRACTION PLANT!

Feed for live stock! To meet the ever-growing demand, the Ralston-Purina Company called on Chemical Plants Division to do the entire job of designing and building new soybean processing facilities. The new solvent extraction plant at Iowa Falls, Iowa, on a final test run, produces in excess of guarantee. It has been doing progressively better ever since.

Whatever your plant expansion or modernization plans — Chemical Plants Division offers you wide and diverse facilities, broad experience, skilled personnel to do the entire job with speed, efficiency and economy. Before you start—call in Blaw-Knox!

CHEMICAL PLANTS DIVISION

BLAW-KNOX CONSTRUCTION COMPANY

321 PENN AVE., PITTSBURGH 22, PA.

solidated Products Co., New York, as a sales engineer.

William A. Munkacsy has been elected president of Munray Products, Inc., sales division of Poly-Cyclo Products Co., Cleveland.

Arthur L. Larson has been appointed assistant to the sales manager of the Falk Corp., Milwaukee.

A. A. Stambaugh has been elected senior vice president of the Standard Oil Co. (Ohio).

J. H. Bryant has been appointed manager of the Tampa, Fla., district of Phillips Chemical Co.'s fertilizer sales division, Bartlesville, Okla.

B. W. Henderson has been made manager of the intermediate and rubber chemicals department for Calco chemical division, American Cyanamid Co., Bound Brook, N. J. **Quintin T. Dickinson** has been named manager of the new coal tar chemicals department.

OBITUARIES

Clifford D. Prickett, 86, a director and vice president of Hercules Powder Co., Wilmington, died December 29.

William H. Baxter, 61, a senior member of the engineering staff of Chemical Construction Corp., New York, died January 20.

C. Edward Lehmkuhl, 43, an executive of Hercules Powder Co., died in Linton, Ind., January 13.

James F. McKeone, 61, superintendent of the steel foundry of Vulcan Iron Works, Wilkes-Barre, Pa., died January 24.

L. S. Kohnstamm, 69, president of H. Kohnstamm & Co., died at his home in New York, January 29.

John P. Newbury, 58, president and general manager of the Eastman Gelatine Corp., Peabody, Mass, died February 2.

Monroe J. Bahnsen, 43, director of chemical research for the Ferro Enamel Corp., Cleveland, died February 3.

Frederic Alan Schaff, 65, chairman of the board of Combustion Engineering-Superheater, Inc., died in Bronxville, N. Y., on February 7.

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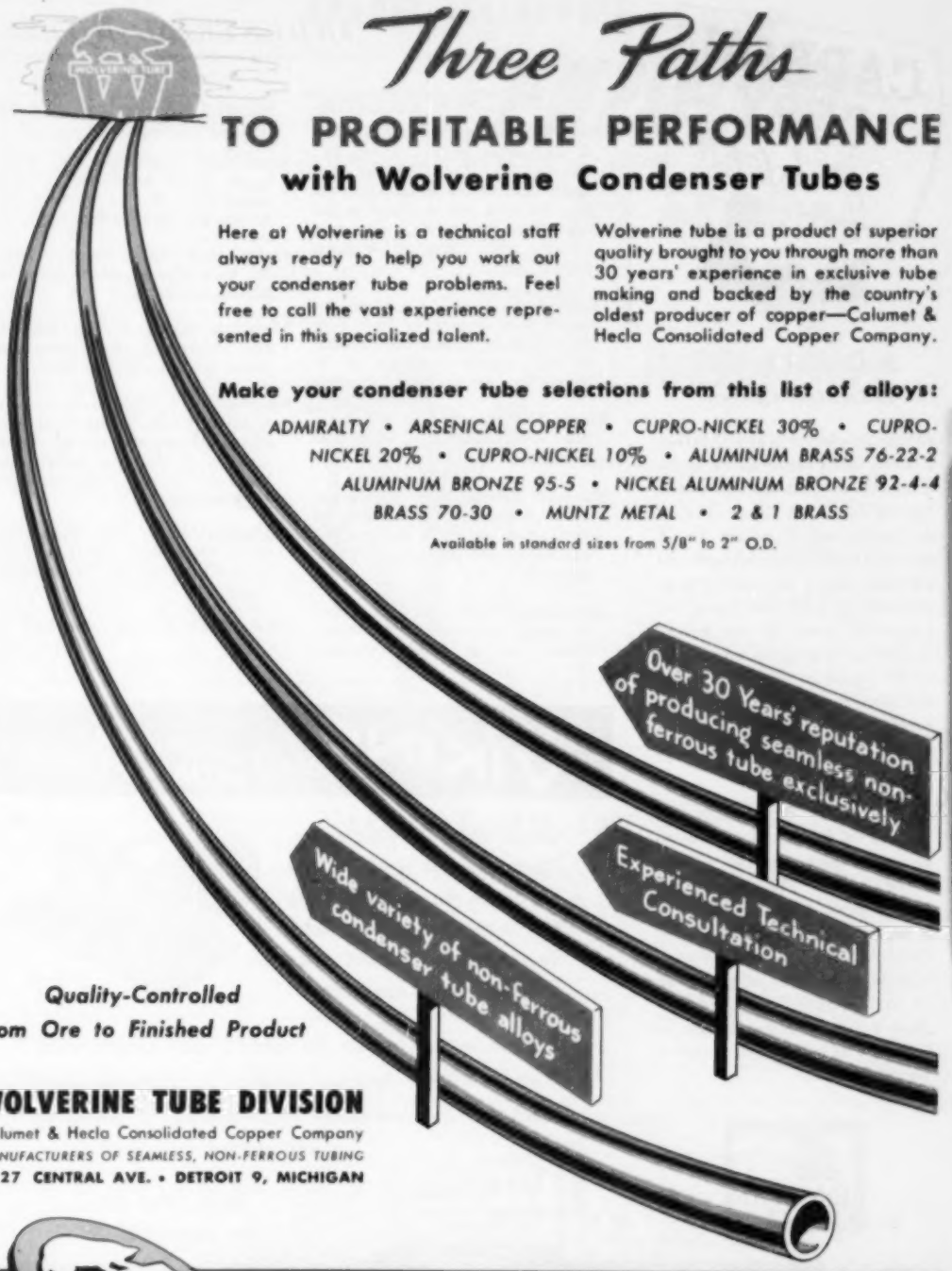
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(No. 11)

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At the completion of any filtration process, solids accumulated in the filter cake retain a quantity of the filtered liquid. A filter cake of activated carbon retains liquid not only in the space between the particles but in the *internal* pore structure as well. The liquid between the particles can be removed by blowing the cake. Some of the liquid in the pores of the activated carbon can be recovered by press-cake washing. What cannot be recovered makes up the retention loss.

Bulk density determines the amount of the liquid that is retained in the press-cake of activated carbon. The greater the bulk density of the carbon, the lower will be the press-cake retention. Activated carbons having high bulk densities ranging from 24 to 35 pounds per cubic foot show retention losses as low as 0.12 to 0.07 gallons per pound of blown filter cake.

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INDUSTRIAL NOTES

NEW FACILITIES

Dow Chemical Co., Midland, Mich.–A sales office at 161 Spring St., Atlanta, Ga. Leroy Stewart, formerly head of the Washington office, has been put in charge of the new office. The territory will cover Georgia, the Carolinas, Alabama and Florida.

Diamond Alkali Co., Cleveland–An export sales division in New York to co-ordinate foreign sales of alkalis and related chemicals. S. S. Savage has been appointed director.

Kinney Mfg. Co., Boston–A Los Angeles sales office headed by Roy A. Woltman.

Sherwood Refining Co., Englewood, N. J.–A plant in Gretna, La., for production of white mineral oil, petrolatum and petroleum sulphonates.

International Paper Co., New York–A branch sales office in Denver, Colo., for its Bagpak division. Russell A. Gair has been made district sales manager.

Mine Safety Appliances Co., Pittsburgh, Pa.–A warehouse in Long Island City, N. Y., to serve the Albany and New York territory.

Carborundum Co., Niagara Falls, N. Y.–a silicon carbide plant in Vancouver, Wash.

Minnesota Mining & Mfg. Co., St. Paul–Additional office and warehouse space in Detroit, Mich.

Koppers Co., Pittsburgh, Pa.–An international sales section to manage and coordinate sales abroad. Headquarters of the new section will be in the company's general offices in Pittsburgh.

Bridgeport Brass Co., Bridgeport, Conn.–A warehouse at Hillside, N. J. It will replace the Newark warehouse.

John Powell & Co., New York–A

(Continued)

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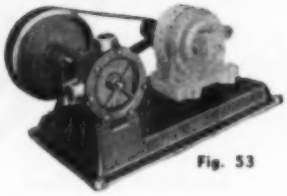

Fig. 53

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Viking PUMP COMPANY
Cedar Falls, Iowa

coast-to-coast network of stocking points and sales offices. The company's present New York plant will serve the Northeast; a new plant in Huntsville, Ala., will provide for the Southeast; there are warehouse facilities in Chicago, Fort Worth, Denver and San Francisco.

General Electric Co., Schenectady, N. Y.—An agency and distributor division to handle sales of all apparatus department products. The new division will replace the apparatus agency division of the company's industrial divisions and will be headed by George L. Irvine.

Riverside Metal Co., Newark, N. J.—District sales offices in Detroit and Rochester, N. Y. W. A. Sweeney will head the Rochester office and R. E. Barbier will handle Detroit.

NEW LOCATIONS

Cowles Chemical Co., Cleveland, Ohio, has moved its research and development laboratory from the campus of Syracuse University to enlarged quarters at 105 South Townsend St., Syracuse.

Selas Corp. of America, Philadelphia, has moved its Chicago office to 3857 West Washington Blvd.

Tube Turns, Inc., Louisville, Ky., has moved its Tulsa office to 420 Wright Bldg.

Commonwealth Color & Chemical Co. has moved to 3240 Grace Ave., New York, N. Y.

NEW LINES

Black, Sivalls & Bryson, Inc., Kansas City, Mo., has purchased all the assets of the Climax Engineering Co., controls division, Tulsa, Okla. The business will be continued under the name Climax controls division, Black, Sivalls & Bryson.

American Air Filter Co., Louisville, Ky., has merged with the Herman Nelson Corp., Moline, Ill., and thereby acquired a line of heating and ventilating equipment. The Herman Nelson division of the American Air Filter Co. will continue to maintain its headquarters and facilities in Moline.

Syracuse Alloy Metals Corp., Syracuse, N. Y., has acquired the entire business of Aluminum Products Co., Pulaski, N. Y. Their entire line of faucets, vise clamps and other hard-

(Continued)

SPROUT-WALDRON'S

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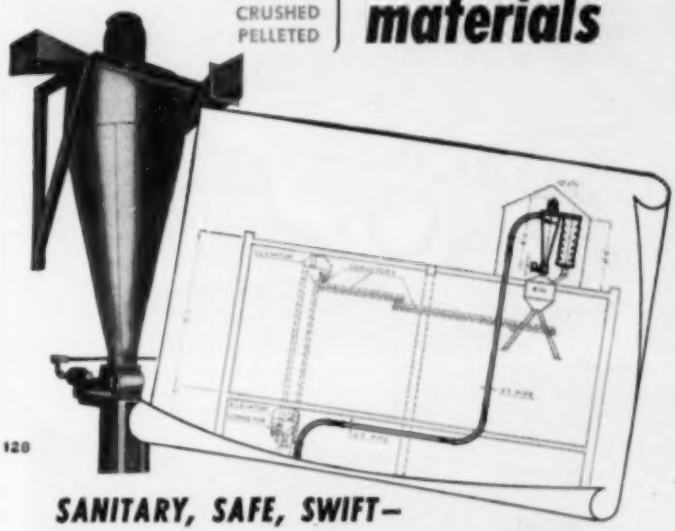

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Pneu-Vac, the modern conveyor system, is rapidly changing the old concepts of bulk materials handling. Adaptable to almost any conveying situation, it replaces bucket elevators and screw conveyors, steps up production and provides sanitary products handling.

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Abrasive Wheels

USE FILE #26-4

Wheels up to 4 ft. diameter are manufactured with "J"* Silicate (1:2) as the binder. The granules are thoroughly coated with heavy, viscous "J", tamped into a mold, air-dried, then baked. The process is fast. Wheels can be used in 24 hours. Dry silicates, SS°-65-Pwd. (1:3.2) and SS-C°-Pwd. (1:2) added to "J" introduce more silicate solids.

Activated Silica Sols

USE FILE #29-9

Silica sols prepared from "N"* Silicate reacted with various acid-functioning chemicals are efficient coagulating aids in water treatment. One case involved water containing 1.08 ppm. manganese, coagulation with lime, alum and N-Sol, removed 95.3% of the manganese with only 4.7% depositing on the filters.

SILICATE P's & Q's

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For more information on these silicate uses write for the above file numbers.

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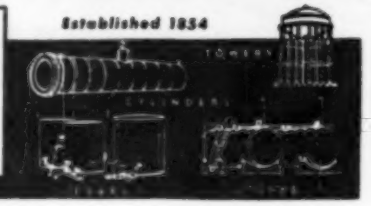

INDUSTRIAL NOTES, cont. . .

ware specialties will be continued by the new owners.

United States Rubber Co., New York, has purchased the chemicals division of Glen L. Martin Co. The rubber company has thereby acquired a vinyl resin plant at Painesville, Ohio, laboratory equipment in Baltimore, patents and the trade name Marvinol.

Standard Steel Corp., Los Angeles, has purchased the Hersey dryer division of Hersey Mfg. Co., Boston.

Houghton Laboratories, Inc., Olean, N. Y., has begun manufacture of a series of anti-corrosive metal primers and surface coatings.

NEW COMPANIES

Tube Turns of Canada, Ltd., Chatham, Ontario, to manufacture welding fittings. It is a subsidiary of Tube Turns, Inc., Louisville, Ky.

Dust-Lay Chemical Co., Sumter, S. C., has been issued a charter. E. C. Wattenbarger is president.

Pulva Corp., Perth Amboy, N. J., to manufacture a line of impact precision type pulverizers for granulating, wet milling and fine grinding. F. Elmer Oswald heads the company.

Taylor Forge & Pipe Works of Canada, Ltd., Hamilton, Ontario, to manufacture wrought steel fittings for pipe welding, spiral welded pipe and a line of heavy forgings. It is a subsidiary of Taylor Forge & Pipe Works, Chicago.

NEW REPRESENTATIVES

Graver Water Conditioning Co., New York, has appointed Fred S. Renauld & Co., Los Angeles, its representative in southern California and Mexico. Russell R. MacDonald Co. has been named sales engineering representative in Richmond, Va.

Hartford-Empire Co., Hartford, Conn., has appointed the H. Smith Bottle Supply Co., Atlanta, Ga., to handle distribution for its Plax Corp. division.

Lee Rubber & Tire Corp., Youngstown, Ohio, has appointed Briggs-Weaver Machinery Co., Houston, Tex., as representative for its Republic rubber division. —*End*

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Especially Designed to Handle Extremely Abrasive and Corrosive Fluids

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BECAUSE . . . exclusive use of a specially designed casing develops streamlined flow, thereby minimizing excessive turbulence normally caused by the cut-water in conventional design . . .

BECAUSE . . . semi-open-type, non-clogging impeller with large fluid passages is designed to reduce the thrust and pressure on the packing . . .

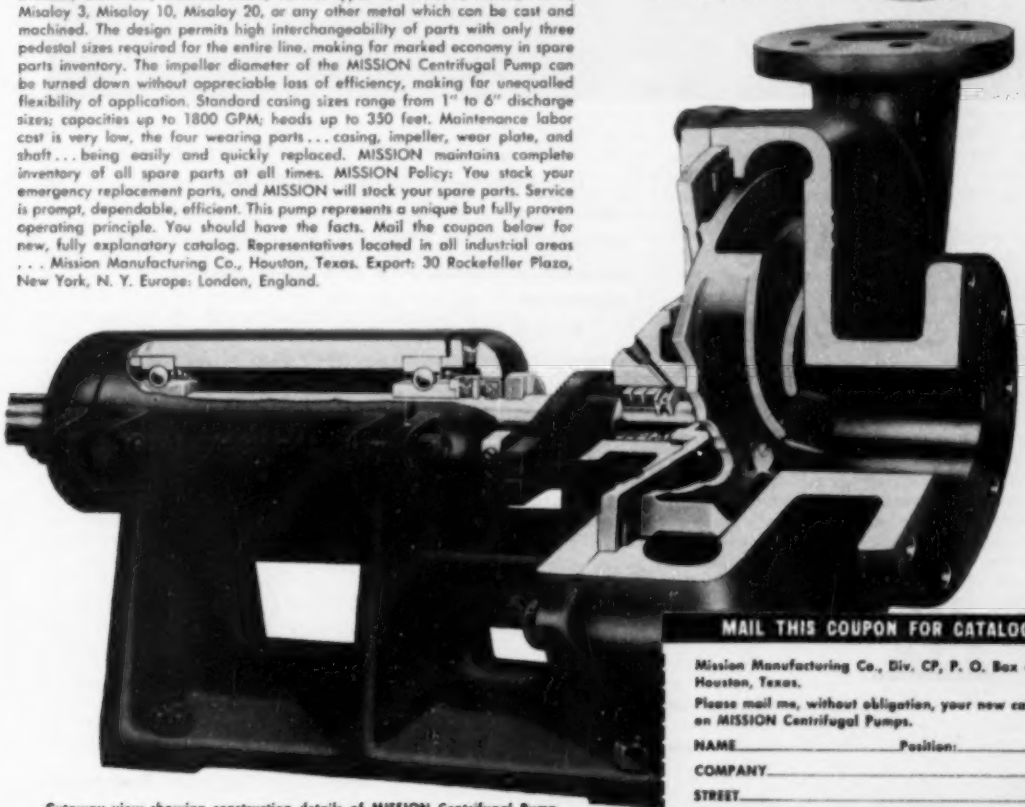
BECAUSE . . . elimination of the cut-water turbulence results in less tendency to bypass back to the suction and eliminates dependence on close tolerances . . .

BECAUSE . . . concentric casing eliminates vibration throughout the entire range of operation, even if the discharge is completely blocked.

The wear factors are further reduced, in the MISSION Pump, by use of the correct corrosion and erosion resistant alloys for the parts coming in contact with the fluids pumped. These parts are available in cast iron, carbon steel, bronzes, aluminum, stainless steels, various types of Ni-Resist, Monel, nickel, Misalay 3, Misalay 10, Misalay 20, or any other metal which can be cast and machined. The design permits high interchangeability of parts with only three pedestal sizes required for the entire line, making for marked economy in spare parts inventory. The impeller diameter of the MISSION Centrifugal Pump can be turned down without appreciable loss of efficiency, making for unequalled flexibility of application. Standard casing sizes range from 1" to 6" discharge sizes; capacities up to 1800 GPM; heads up to 350 feet. Maintenance labor cost is very low, the four wearing parts . . . casing, impeller, wear plate, and shaft . . . being easily and quickly replaced. MISSION maintains complete inventory of all spare parts at all times. MISSION Policy: You stock your emergency replacement parts, and MISSION will stock your spare parts. Service is prompt, dependable, efficient. This pump represents a unique but fully proven operating principle. You should have the facts. Mail the coupon below for new, fully explanatory catalog. Representatives located in all industrial areas . . . Mission Manufacturing Co., Houston, Texas. Export: 30 Rockefeller Plaza, New York, N. Y. Europe: London, England.

Conventional Casing Design. Turbulence accelerates corrosion and erosion.

MISSION Concentric-Casing Design. Note streamlined flow, absence of turbulence.



Cutaway view showing construction details of MISSION Centrifugal Pump.

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Quotes, Extracts and Digests

MORGAN M. HOOVER, Assistant Editor

Dr. Wilhelm Hirschkind

Pioneer in Process Development

Robert G. Heitz

NOTE: *After two score years in one field, a man develops a philosophy about his work. Dr. Wilhelm Hirschkind's work is process development, and his philosophy has become the guiding light of Dow Chemical's Great Western Division.*—EDITOR.

One principle of process development set forth by Dr. Hirschkind is the wisdom of purifying the raw materials whenever possible. In general, it may be seen that impurities in the available feed stock often must be separated at one stage or another from the component which forms the salable product. A complete study based on exhaustive experimental work will indicate whether the most economical place is at the beginning, at an intermediate point, or at the product end of a process. In view of the possible savings of time and research expense, however, it is often wise to make the choice of purifying first and neglect the exhaustive study of alternates. Arguments for this choice in the chlorination of methane may be seen from the facts that a single impurity, such as propane, can become as many as thirty when chlorinated and that the analysis of products and study of process variables are thereby greatly complicated. A good case often exists for separating first even an impurity which would not contaminate the product, since some impurities such as oxygen in a photochlorination process will greatly reduce reaction rates, and even inerts such as nitrogen require enlargement of equipment to merely carry them through the process. This latter point is especially pertinent if a recycle of unused starting material is necessary.

Another practice of value in attempting to reduce the time spent in developing a process is to start chemical engineering process design as early as possible. This, as has often been pointed out, focuses attention in the experimental work on the factors of greatest economic importance. Although it may result in some preliminary process design being wasted on alternates which are thrown out experimentally, it also shortens the time required for final plant design after the experimental data are obtained.

A favorite attack of Dr. Hirschkind's is to study consciously the possibilities of combining reactions. Thus in his process for manufacture of HCl he combines the endothermic reaction of chlorine plus steam with an exothermic reaction of the byproduct oxygen so formed with methane. Likewise, in his description of the process used at Great Western for the manufacture of perchloroethylene he points out the combination of an exothermic reaction, the chlorination of a hydrocarbon with an endothermic process, that of splitting out HCl or Cl_2 from a chlorinated hydrocarbon.

Although keen himself in thus using theoretical reasoning to seek out possibilities, Doc, perhaps thinking of the classical controversy over the NH_3 synthesis, has always tested them early with critical experiments. This may sound very obvious, but so are some of our errors. I am reminded of the motorcycle rider and his passenger behind him, who were coming into town late one afternoon. As it was growing dark, the man behind complained of the cold wind blowing through him. The driver stopped, had him put his coat on backward, buttoned him up the back, and proceeded on his way. As they came into town they naturally soon crossed a street torn up and bumpy. The passenger was thrown off but the driver didn't notice until he turned a corner several blocks farther along. Coming back he saw a crowd collecting, elbowed his way in, and asked "How is he? That's my buddy." An old man, bent over the form lying on the ground, replied, "I don't know, son; he was starting to mumble and stir a bit when we first got here, but he hasn't said a thing or even moved since we turned his head around the right way."

Glenn Allen, George Henderson, and I were discussing the operation of the chlorination plant at Pittsburg, complaining rather bitterly about the excessive amount of equipment and labor necessary to finish the hexachloroethane by crystallization—only a few percent of the plant's production. Contrasting with this, all the other products were almost effortlessly finished by distillation. Upon being encouraged by Doctor Hirschkind to do something constructive about this, we found that hexachloroethane, although never a liquid at atmospheric pressure, could be distilled at pressures of only a few pounds gage. After a preliminary period of operation during which the liquid from the still was cast into slabs and ground, a procedure was worked out whereby the liquid was evaporated under pressure and the resulting vapor discharged through a distributor into the V-shaped trough formed by two water-cooled flaking rolls. Here the vapors

Dr. Wilhelm Hirschkind, of the Dow Chemical Co.'s Great Western Division, was born in 1886 near Nuremberg, Germany. He studied under Professor Haber at the time the first drops of liquid NH_3 were synthesized. After working for two years in a dye factory, he came to the United States in 1912 as a delegate to the Eighth Congress of Applied Chemistry. He remained to teach at the University of Illinois and work on natural alkali sources in the West before coming to Great Western. Here he developed many processes in a relatively few years with a small staff. Among the products made were $FeCl_3$; NH_4Cl; $ZnCl_2$; HCl from Cl_2, steam, and gas; hydrosulphites; xanthates, MeBr; and chlorinated hydrocarbons.

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4. Collects the results of studies carried out in the California Radiation Laboratory. The primary emphasis is placed on the case of electrical discharges in the vapors of uranium compounds. By A. Guthrie, Univ. of Cal., and R. Wakerling, Univ. of Cal. $3.50.

VACUUM EQUIPMENT AND TECHNIQUES

5. A compilation of observations made in the course of developing high vacuum equipment for use in electromagnetic separation plants. Noteworthy is the book's discussion of the use of the vacuum analyzer and helium leak detector. By A. Guthrie and R. Wakerling, Univ. of Cal. $2.50.

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QED, cont. . .

lay in a pool, condensing on the rolls to form the finished flake as the rolls revolved. These vapors, of a density of five times that of air and at a temperature of 185 deg. C., had a fairly sharp boundary surface which surged and flowed much as waves do on the ocean. In fact, the principal problem in designing the vapor feed distributor was to keep them from surging out. The nicety of design required may be appreciated by considering that the residence time of the vapors between the rolls was less than one second. It was like filling a water trough in less than a second without slopping any over the edge.

In this connection I shall never forget an elegant experiment by Harry Bender which illustrates the value of knowledge in fields other than one's specialty. Harry was designing the above-mentioned vapor distributor and recognized some points of similarity with the problem of designing a gas burner. By turning the distributor upside down, supplying gas instead of hexachloroethane to it, and operating it as a burner, he adjusted the proportions of the unit until the flame burned uniformly along the entire length of the header. It is not surprising that it operated perfectly on the first trial with hexachloroethane.

This last example gives us, I think, one of the surest keys to the future. I am sure that ten years from now we can all look back on several interesting and successful developments in applied chemistry. I know many of you will say with me, "Why didn't I see that?" A goodly part of these will concern old problems. I feel sure that some of these will be found by the alert chemical engineer who crosses the artificial boundaries, or parallels of latitude, which bound chemical engineering, and looks back from a new vantage point. He will be the chemist who, pretending that he is a physicist or biologist and looking into the old well-known fields of chemistry, is amazed to see how new and poorly known they really are. Some of these new vistas will be tomorrow's new approaches to today's old processes.

Robert G. Heitz, Dow Chemical Co., before the American Institute of Chemical Engineers, San Francisco, Calif., Nov. 2, 1949.

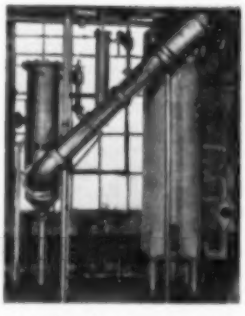
FLUORINE

. . . *and the Future*

Earl T. McBee

With the rapidly increasing knowledge of fluorine chemistry, the produc-

WHAT WILL SUMMER HOT WEATHER DO TO YOUR PROCESS



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CHILL-VACTORS have many advantages, but are not perfect. In general, they are limited to temperatures above 32°F. They require more condenser water than mechanical refrigeration, but almost any natural water, including sea water, can be used. There are too many advantages to list here. The most important are:

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CHILL-VACTORS STEAM JET EVACTORS CONDENSING EQUIPMENT

tion of exceptionally stable coolants, lubricants, hydraulic fluids, and lubricant additives is to be expected.

It may become practical in the near future to produce automobiles in which the engine oil and other lubricants need not be changed and will require only infrequent inspection.

The fluorine analogue of the insecticide DDT has been found to have properties superior to those of DDT itself. Anesthetics containing fluorine possess properties better than the commonly used ether and cyclopropane in that decreased amounts of fluorinated compounds are required to produce anesthesia, and the fire hazard commonly associated with the usual anesthetics is eliminated. Fluorine-containing substances are being investigated now for various medical applications.

An excellent high voltage insulation material has been found in sulphur hexafluoride. This inert substance has has been produced in commercial quantities by burning sulphur in a stream of fluorine. Many other fluorine-containing compounds, ranging in properties from very low to very high dielectric constants, have been found to be very interesting as possible new dielectric and capacitor fluids.

Superior synthetic rubber may be prepared from the fluorine analogues of butadiene and other chemicals which have been produced by research in the polymer field, and fluorinated plastics may supplement many of the familiar materials presently in use.

Only the production costs of fluorinated materials remain as a barrier to many new, large-scale commercial applications.

Earl T. McBee, Purdue University, before the New York Section, American Chemical Society, Jan. 21, 1950.

RUBBER

. . . Cold Competition

W. B. Reynolds

50,000-mi. truck tires, 75,000-mi. passenger car tires, and longer-wearing foam rubber furniture are among a host of improved products promised by the development of cold rubber.

Although cold rubber, so called because it is produced at the relatively low temperature of 41 deg. F., was

(Continued)

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CARSON P. FRAILEY, *Exec. Vice Pres. American Drug Manufacturers Ass'n.*

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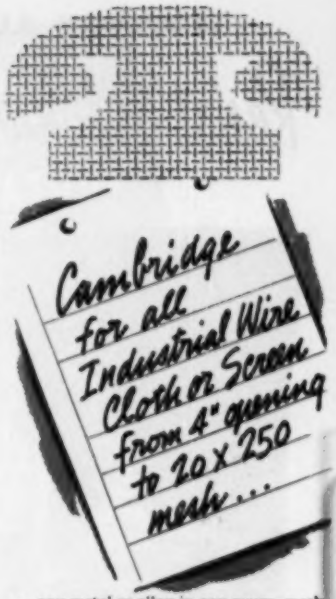

. . . any metal or alloy in any gauge, mesh and weave that will give you the best performance in your filtering or screening operations or for fabricating purposes. Cambridge offers you one-source buying simplicity on all your wire screen or metal cloth requirements.

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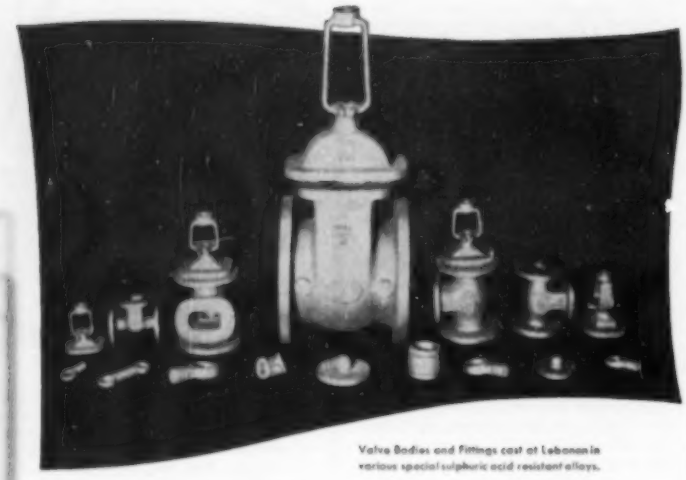
LEBANON ALLOY CASTINGS

Resist Sulphuric Acid Attack



Valve Bodies and Fittings cast at Lebanon in various special sulphuric acid resistant alloys.

FOR CHEMICAL AND PROCESS INDUSTRY APPLICATIONS . . .

DURING the period of development of special alloys to resist sulphuric acid and sulphuric and nitric acid combinations, Lebanon played an important part in proving their value as casting material. Lebanon Circle L 34 (Stainless Type FA 20*), analysis of which is given below, is an alloy created to meet this demand. Circle L 34, in addition to its resistance to sulphuric and nitric acid, offers good resistance to alkalis and alkali salts.

Our familiarity with the manufacture of castings of special alloy materials means that we can readily meet your requirements. Every Lebanon casting is made to exacting standards, inspected and thoroughly tested before shipping. A complete laboratory, including a million-volt X-Ray machine, is one of the facilities upon which our customers constantly rely.

Do you have copies of the Lebanon Data Sheets? If not, just let us know and we will send them along to you.

LEBANON CIRCLE L 34

NOMINAL ANALYSIS

Carbon Max.	0.07 Max.
Silicon	1.25
Manganese	0.75
Chromium	20.50
Nickel	28.50
Molybdenum	2.50
Copper	4.25

NOMINAL PHYSICAL PROPERTIES

Tensile Strength	72,000
Yield Point	35,000
Elongation in 2"—%	45
Brinell Hardness	150

Heat treatment: Water quenched.

*Circle L 34 (FA 20)
DuPont Specification 1364

LEBANON STEEL FOUNDRY • LEBANON, PA.
"In the Lebanon Valley"

LEBANON ALLOY AND STEEL *Castings*

CIRCLE L

BASIC . . .

"It is the customer, and the customer alone, who casts the vote that determines how big any company should be."

CRAWFORD H. GREENEWALT, *President*
E. I. du Pont de Nemours & Co.

QED, *cont. . .*

first made commercially less than two years ago, it had reached an annual output rate of more than 150,000 long tons by the end of 1949.

The new rubber is superior to natural rubber for tire treads and a great variety of other items in the mechanical goods, wire and cable coating, and footwear fields. For the first time since the discovery of vulcanization, natural rubber is faced with vigorous and healthy competition both economically and quality-wise.

Using cold rubber, it is possible to produce passenger automobile tire treads capable of running 60,000 to 75,000 mi. under average service.

Tire tread technology has outstripped carcass development to such an extent that carcass life is usually the factor now limiting tire wear. Although this limitation is economic in part, it is probable that we will not see a practical attainment of the 75,000-mi. passenger tire until fabrics and carcass stocks have been improved without undue increase in construction costs.

Unfortunately, the present intensive price competition in the tire field is not conducive to the development of longer-wearing carcasses, since emphasis has been focused upon price rather than quality.

W. B. Reynolds, Phillips Petroleum Co., before the New York Section, American Chemical Society, Jan. 21, 1950.

CERAMICS

. . . *in Gas Turbines*

Winston H. Duckworth and I. E. Campbell

Gas turbines with higher operating temperatures, longer life, and possibly with lower weight are predicted.

General progress in ceramics for gas turbines is manifested by advances in refractory materials free from the influence of a glass phase. The elimination of glass is necessary as it has notably poor resistance to thermal shock and tends to soften and deform under stress at relatively low temperatures.

Investigations have been rather thorough on most of the refractory oxides singly, and on many combinations

. . . RESPONSIBILITY

"The larger integrated companies of American industry have a special requirement to participate in thinking out ethical standards of conduct applicable to firms with great economic power."

EDMUND P. LEARNED, *Professor Harvard Graduate School of Business Administration*

of oxides. Though there are several ceramic materials now available that might serve advantageously for parts operating in the hot zones of gas turbines, the successful use of such materials involves problems of gas turbine engineering.

Stator blades, with their lower mechanical requirements, offer a somewhat more likely future for ceramic bodies than rotor blades. Even without higher operating temperatures, it is possible that such blades would reduce weight and cost if used to replace metal blades in present designs.

Since ductility is necessary in the combustion-chamber liners of present designs, direct substitutions of ceramic bodies for the sheet metal now used is not possible. However, there are indications that metal-supported, ceramic liners will withstand the conditions of service. In addition, ceramic bodies might be used to insulate combustion chambers if the need becomes sufficiently acute to justify design changes.

In addition to the work on ceramic bodies, a large portion of the ceramic research pertinent to gas turbines is directed toward developing and evaluating refractory ceramic coatings for metals. Such coatings seem particularly attractive for immediate use. They are not expected to afford outstanding benefits, but they are likely to extend significantly the usefulness of alloys and few, if any, design changes are anticipated in order to use them.

The most generally useful method developed to date for the formation of refractory coatings involves the vapor-deposition processes in which the coating is formed by chemical reaction at the heated surface of the base material.

Perhaps the most outstanding development on vapor-deposition processes is the development of protective coatings for molybdenum that have permitted its use in air for over 5,000 hours at 1800 degrees F. and as long as 200 hours at 3100 degrees F. In a number of tests for short-time applications in extreme high-temperature flames, molybdenum so protected has given outstanding performance.

(Continued)

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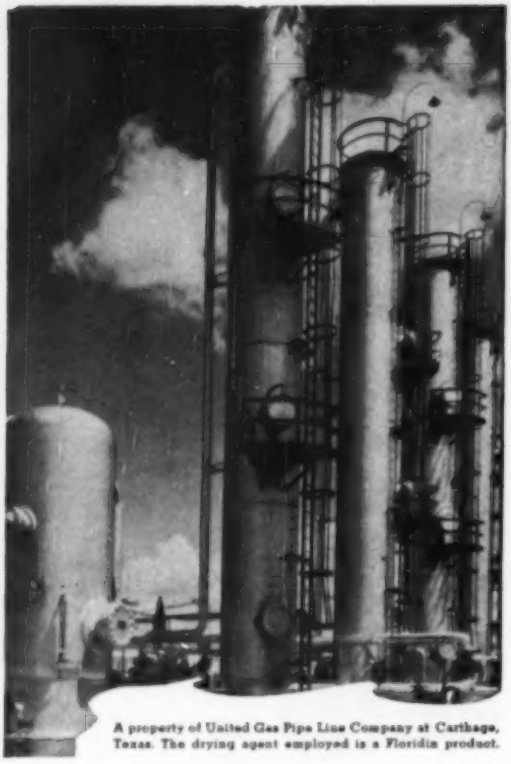

A property of United Gas Pipe Line Company at Carthage, Texas. The drying agent employed is a Floridin product.

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FLORAID
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Floridin is the oldest producer of Florida Fullers Earth and commands adequate supplies of raw materials from the finest natural deposits known anywhere. Extrusion and other special processes add greatly to effectiveness and adapt the product to specific uses. Correspondence is invited.

BAUXITE Made from the most suitable selected bauxite by special methods of activation and mechanical adaptation, Floridin products have been found superior to other granular desiccants for many industrial uses. More specific information will be given on request.

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Department A, 220 Liberty St. Warren, Pa.

QED, cont. . .

Examples of coatings of potential interest are silicon or silicon carbide on graphite for oxidation resistance, boron carbide on graphite and other ceramic materials for wear resistance, and refractory metals, such as tungsten and tantalum, on other metals for heat and erosion resistance under non-oxidizing conditions.

Winston H. Duckworth and I. E. Campbell, Battelle Memorial Institute, before the American Society of Mechanical Engineers, New York, Nov. 29, 1949.

AIR POLLUTION

. . . *Trends*

Louis C. McCabe

In the ten years between 1938 and 1948, the gain in dollar value of industrial production in the United States was more than 200 percent. Manufacturing plants increased 39 percent and 52 percent more people were employed at the end than at the beginning of the period. Industry will continue to expand and it is essential that it do so. It is by no means the only source of air pollution, but it is in industrial centers that the most difficult problems are encountered.

Many industries are controlling dusts, fumes, odors and smoke by change in process, collection at the source, or by adjustment to weather conditions. Thorough investigation of the means available is essential, however, to avoid excessive cost or outright failure.

Generally, there is inadequate knowledge to guide the development of standards, and objectives are confused to some extent by lack of physiological information and by insufficient understanding of the chemical and physical behavior of contaminants in the atmosphere itself. This situation may result in unduly lax regulations that are ineffective, or in codes incapable of enforcement. At its worst, this complex technical problem may be used to serve obscure and unrelated political ends.

On the constructive side, more effort is being devoted to atmospheric pollution as a scientific problem than ever before. Public, private and industrial research groups have entered this

POWER FOR 1/3c. PER KWH.

"For industrial power the average revenue for all Canada is about one-third of a cent per kilowatt hour, or about one-third that in the United States."

HUET MASSUE, *Engineer Economist Shawinigan Water and Power Co.*

INFLATION

"The average yield of copper from a ton of ore today is less than 20 percent of what it was around the turn of the century."

JOHN D. SULLIVAN, *Assistant Director Battelle Memorial Institute*

important field of investigation. Reliable fundamental information is being developed. New and more effective equipment and methods of control are certain to result.

Louis C. McCabe, Bureau of Mines, before the First National Air Pollution Symposium, Pasadena, Calif., Nov. 10 and 11, 1949.

AIR POLLUTION

. . . *Economics*

Weldon B. Gibson

The problem of air pollution control has in the past been approached largely from the technical or scientific viewpoint. As substantial progress has been made on solution of the various technical problems involved, it has become increasingly evident that increased attention must be devoted to economic problems of air pollution control confronting American industries and municipalities.

It is to be expected that the initial attack on air pollution should be made in the technical fields. It was first necessary to determine just what causes air pollution and then to develop scientific means for controlling the sources of air contamination. While these objectives have not, and probably may never, be achieved completely, time has arrived when the economics of implementing air pollution control measures must be measured. While the attainment of so-called "pure" or "clean" air in and around our cities is a worthy objective, American industries and municipalities can never afford the economic cost involved in achieving the ultimate objective. The problem is one of determining where the point of diminishing returns arises; that is, where the economic costs of air pollution control exceed the economic gains to be derived from such control.

There are many instances where air pollution control measures produce a net financial gain to the controlling company or industry. However, these instances do not involve more than 10-15% of the total costs of control measures installed to date. The balance of such costs, of course, produce many indirect social and economic gains to the communities involved, or, in other words, gains in the public welfare. Air pollution control is a

(Continued)

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Other Superpressure Products

REACTION VESSELS—Various types, with or without agitating mechanisms. Capacities from 43 ml. to 6 gal., for pressures up to 60,000 psi and temperatures up to 800° F.

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QED, cont. . .

costly undertaking and the necessity for such expenditures cannot be eliminated or greatly reduced. We must consider that for years to come these expenditures will be largely in the public interest rather than in the interest of direct financial gain.

Weldon B. Gibson, Stanford Research Institute, before the First National Air Pollution Symposium, Pasadena, Calif., Nov. 10 and 11, 1949.

CRACKING

. . . *Ethylene*

R. M. Deanesby and C. H. Watkins

Autothermic cracking is the name given to processes in which the endothermic heat of cracking is offset by introducing air or oxygen with the feed so that the over-all reaction is self sustaining. The broad idea in one form or another is not new, but reconsideration and redevelopment of it starting from first principles has led to processes which are radically different from former applications of the concept. Some of its practical advantages and disadvantages are obvious. The heat is generated *in situ* so that high temperatures and pressures can be reached in simple insulated reactors without having to transfer heat through the reactor wall. And by the use of higher temperatures, shorter residence time and smaller reactors are possible. On the other hand, unless we go to the expense of pure oxygen, the products of reaction are diluted with nitrogen. The dilution with gaseous products of combustion is of less significance but cannot be ignored.

Consideration of the balance between the heat requirements of cracking and those liberated in combustion reactions leads to definition of the "Thermochemical efficiency" of the practical process as the ratio heat absorbed by cracking reactions/heat evolved by combustion reactions.

By the proper design and use of heat exchange between product and feeds to the reactor this efficiency is raised and dilution of cracked products with nitrogen and carbon oxides is minimized.

Ethylene production by auto-

LAND OF THE FREE

"Canada is the one country in the world in which industry is absolutely free from any threat of expropriation or conquest."

N. E. Tanner, *Minister of Mines Province of Alberta*

thermic cracking from propane, from ethane, and from mixed stabilizer gases containing these has been systematically studied; heavier feed stocks have also been examined.

Consideration is given to full scale design based on pilot plant work. The process is operable at higher conversions and less recycle than tubular pyrolysis. Yields from ethane range from 75 to 85 percent in the practical operating range; dilute feeds containing as much as 50 percent methane can be used satisfactorily. A given plant can operate efficiently over a wide range of feed composition and operating conditions, but the particular choice of conditions will be governed chiefly by local factors.

Apart from the simplicity and flexibility of the process, in general, it reveals certain inherent advantages over tubular cracking: (1) high ethane conversions (up to 96 percent per pass) are obtained, in contrast to practical limitation to 50 percent or less in tubular reactors; (2) dilute feeds may be used satisfactorily; (3) when cracking propane, butane, or heavier stocks, the C_3 cut contains 92 to 94 percent ethylene compared to 75 to 80 percent when using tubular furnaces; (4) in spite of dilution with nitrogen and products of combustion the ethylene content of the raw product gases is just about as high as from tubular reactors, so that the recovery and concentration costs are not greatly different.

R. M. Deanesby and C. H. Watkins, Universal Oil Products Co., before the American Institute of Chemical Engineers, Houston, Tex., Feb. 28, 1950.

STRATEGY

. . . *for True Liberals*

Robert E. Wilson

What should be the strategy for *true* liberals? I should like to suggest twelve answers, the first seven of which will involve our discontinuing some of the things that many of us industrialists have been doing:

1. We must stop running to the government for help.

2. We must stop running to Washington to complain about our competitors or to urge the government to regulate a competing industry.

(Continued)

1 YD.=X FT.

"It is deceptive to compare profits of 1947 and 1948 with those of former years because severe inflation has completely distorted the dollar yardstick."

J. Howard Pew, *Director*
Sun Oil Co.

And what is "Duralizing"?

It's a surface treatment given to the casting

1 . . . to make it more resistant to abrasion
2 . . . to make it more resistant to molten metal
3 . . . to minimize "pick up"

This is a treatment we developed in our own laboratory and foundry to meet special conditions for certain furnace operations. Normal high alloy castings would withstand the heat all right but abrasion, erosion and pick up were something else again. The "Duralized" Rolls solved the problem.

While you may not need a high alloy casting calling for the Duralizing treatment, you may have a high alloy casting problem. We'll be glad to study it with you and recommend the alloy and type of casting best for your requirements.

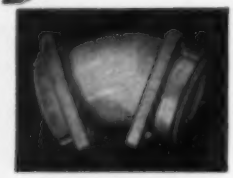
THE DURALOY COMPANY

When it comes to
HANDLING
CHEMICALS

SPECIFY ILLINOIS PORCELAIN!

Porcelain's inherent corrosion-resistant qualities make it impervious to electrolytic action. Therefore it is outstanding as a successful handling medium for chemicals. Specify Illinois porcelain for permanent systems, thereby eliminating frequent replacements of corroded parts.

ANGLE VALVES
Available in all standard sizes from 1" to 6", these valves are designed for easy installation. Wherever an elbow can be removed, a valve can be installed because of exact dimensions.



PIPE AND FITTINGS
The inside and outside of all porcelain pipe and fittings are glazed white. The ends are ground true and smooth for gasket mounting. Flanges are accurately jig-assembled. Necessary bolts and nuts to make all connections are furnished for every joint.

WRITE
FOR
CATALOG C-3

Y-VALVES
Each Illinois valve has a very carefully ground and lapped valve seat which will hold chemicals at high pressures. Every valve is routine tested at 100 pounds pressure for a minimum of one hour to assure a perfect valve seat. Note that valve seat is located in lowest possible position to insure uninterrupted flow of material when stem is in open position. Packing is acid-resisting asbestos — graphite impregnated.

CHECK VALVES
Both vertical and angle check valves are porcelain to porcelain with no metal in contact with material being handled. Friction loss extremely low because ample space provided for flow around ball. Valve seat ground and polished to very close tolerances — ball is a polished sphere.

CHEMICAL
ILLINOIS
ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS

QED, cont. . .

3. We must get it out of our heads that the common man is going to get worried about our problems or our freedom unless he understands how it affects him.

4. We business men must stop talking to ourselves and speak before audiences which are less glamorous and friendly, but more numerous and politically potent.

5. We shouldn't try to talk about broad generalities like free enterprise or statism, but rather tell the accomplishments, problems and aspirations of our own industry, or the role of industry in our own community.

6. We must stop being defeatists and go to work.

7. We must stop depreciating our verbal currency by calling everything we don't like Socialistic or Communistic.

8. We must make sure that our own house is in order and that we maintain high standards throughout the business community.

9. We must appreciate the necessity for the economic education of our own employees.

10. We must clear up misunderstanding as to who is paying for all these activities at home and abroad.

11. We must all realize an attack on the freedom of one is an attack on the freedom of all, and stand together.

12. Finally, when we get discouraged let us remember that early death of our democracy was widely predicted 160 years ago—and for the very reasons that now threaten us—the belief that if the common man had the vote, demagogues would be able to sell them false nostrums which would eventually destroy the republic. Yet our republic has survived and we've made unbelievable progress.

Robert E. Wilson, Standard Oil Co. (Ind.), before the Transportation Association of America, Chicago, Nov. 30, 1949.

INDUSTRIAL TRAINING

. . . *College Graduates*

K. B. McEachron, Jr.

The present program [at General Electric] consists of from three to five three-month assignments for each man in training. Although some considera-

IF THE TIME COMES

"Since fissionable material in weapons does not deteriorate or become obsolete, it remains available for conversion to peaceful uses when the time comes."

L. L. Strauss, *Commissioner*
Atomic Energy Commission

tion is given to individual preferences, the primary objective is breadth of work experience. At the conclusion of each assignment, each man is carefully rated on his performance and his capacity for future growth. These ratings are periodically discussed with each trainee as an aid to his improvement. After his second or third assignment, placement possibilities are discussed with him by the program supervisor. Interviews are then arranged with those interested units which seem most suitable for the particular trainee. The variety of available placements is so great that seldom is it impossible to match man and job.

Each fall, about 20 men are selected on the basis of interest and ability for an intensive course in process technology. The course is approximately nine months in length and consists of one four-hour class each week. A single, comprehensive, technical problem, assigned each week, is the principal factor in developing the ability of these men to apply their technical knowledge effectively. The class hours include lectures, quizzes and problem discussions to supplement the working of the weekly problem.

From the first year class in thermodynamics and basic physical chemistry about half of the men are selected for a second year in more specialized and advanced theory. This class has usually concentrated on some advanced phases of chemical engineering. Men completing this two-year technical program have a unique combination of theoretical education and practical training.

Although the first supervisor of the program was necessarily drawn from outside the training activities, subsequent supervisors of the first and second year courses and of the whole program of training and education have been drawn exclusively from the training group. In this experience, we have realized again how great is the enthusiasm and eagerness of men so selected to do an outstanding job and how effective such an attitude is in the training process itself. By carefully selecting from the best qualified the one or two supervisors required each year, we can have in such positions for a year or so men whose potential in the organization is far greater than

(Continued)

1 LB. = 2¼ LB.

"Cellophane output by all producers in 1949 will amount to nearly 300 million pounds. And it takes nearly 2¼ of raw materials to make a pound of cellophane."

C. H. GREENEWALT, *President*
E. I. du Pont de Nemours & Co.

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Is YOUR plant protected against water shortage? Peak load demands on municipal water works with inadequate pumping, or reservoir facilities, can slow down, or stop, manufacturing operations.
To avoid that costly possibility, many plants installed Deming Deep Well Turbine Pumps. The vertical, multi-stage construction of these units make it possible to utilize underground water sources at almost any depth below the surface.
In addition to protection against water shortages, many owners of Deming Deep Well Turbine Pumps report savings up to 60% over high rates of central station water works in their areas.
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Water Lubricated
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For more information on the advantages of Deming Deep Well Turbine Pumps for factory water supply and other uses, write for free Bulletin No. 4700-B.
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for smaller volume, moderate pressure applications

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1. Air for combustion with oil or gas burners, small cupolas, coke-fired forges, etc., in:

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- Asphalt heaters
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- Oil-fired forges
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- Boosting fuel supply to industrial furnaces
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- Boosting pressure from small gas wells
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- Gas sampling equipment
- Inert gas generators
- Exhausting oil vapors
- CO_2 collectors
- Boosting supply to gas engines

These bulletins bring you up to date on construction, capacities, regulation, control and other details on R-C Type AF Blowers (Bulletin 21-B-37) and Type XA Gas Pumps (Bulletin 31-B-17). Send for them or write us about your needs, for engineering analysis, without obligation.

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503 Illinois Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE
BLOWER BUILDERS SINCE 1854
ONE OF THE DRESSER INDUSTRIES

QED, cont. . .

is that of the average training director. The high tone of our training programs is due in large measure to this practice in operating such programs.

K. B. McEachron Jr., General Electric Co., before the American Institute of Chemical Engineers, Pittsburg, Dec. 7, 1949.

RODENTICIDES

. . . *and Witchcraft*

Charles D. Thurmond

Man is rat's softest touch. For centuries his greatest defense against the rat was witchcraft. One of the charms to get rid of the rats in Ireland and Scotland was to beat loudly on a skillet and shout

"Beat for the rats.
Beat for the rats.
Go to so-and-so's house.
There is a bridge to pass."

Witchcraft and sorcery also were used against the rat in the early days in this country. Some New England farmers were accustomed to writing a notice of eviction to the rat. They not only told the rat to move his family out, but stated exactly where they were to go—usually to a house of an unpopular neighbor. These notices, which were placed in a rat-hole, were usually rubbed with grease or tallow so that the rat would not only read and mark them, but also "inwardly digest them".

Poison is the most efficient means of destroying rats. Six of the ten rodenticides generally used were in common use prior to the war. The remainder were directly or indirectly the result of war-inspired research to obtain adequate battle-area rat control.

These new rodenticides are Antu and Compound 1080, both developed in this country, and Castrix and a related product developed by German scientists. The German chemicals now are being investigated further.

A new rodenticide, which will soon be available, is known as Compound 42. It was discovered during cattle disease studies made in the Department of Biochemistry at the University of Wisconsin. Compound 42 is a tasteless and odorless substance which causes rats to die of lung hemorrhage.

OPPORTUNITY

"An annual market of 100,000,000 lb. of fabric awaits the development of an effective yet inexpensive flame-retarding process."

K. H. BARNARD
Textile Resin Department
American Cyanamid Co.

One of the best rodenticides is Compound 1080 which is manufactured by Monsanto. In discussing its use, we emphasize the need for extreme caution and point out the rigid precautions taken by both Monsanto and government officials in controlling 1080's distribution and application. It is available only to professional exterminators and government agencies.

Other "ratistics":

There are more rats than people in the United States—155 million rats to 150 million people.

The rat has caused mankind more trouble, more expense, more suffering and more death, than all the wars combined.

The annual damage caused by rats has been estimated at $500 million, mostly in agricultural products.

Rats destroy and eat as much food each year as 265,000 farmers produce in the same period.

Charles D. Thurmond, Monsanto Chemical Co., before the Pacific Insecticide Institute, San Francisco, Nov. 3, 1949.

AMMONIA

. . . *Controlling Corrosion*

F. T. Gardner, A. T. Clothier, F. Coryell

Laboratory studies have shown that ammonia in concentrations as low as 0.4 percent in systems containing 2 percent hydrogen sulphide by volume is effective in controlling vapor-zone corrosion. Patent applications have been filed to cover this development, and patent rights have been assigned to Standard Oil Development Co. Results of experimental field work with 55,000 bbl. tanks showed that the efficiency of protection gradually increased from 16 percent when an inhibitor injection rate of 1.4 lb. per tank per day was employed to almost complete protection when 12 lb. to 15 lb. per day were added to the tank vapor zone. The uninhibited corrosion rate measured simultaneously in tanks in similar service averaged 273 mg. per sq. decimeter per day, or 0.053 in. per yr., for the entire test period.

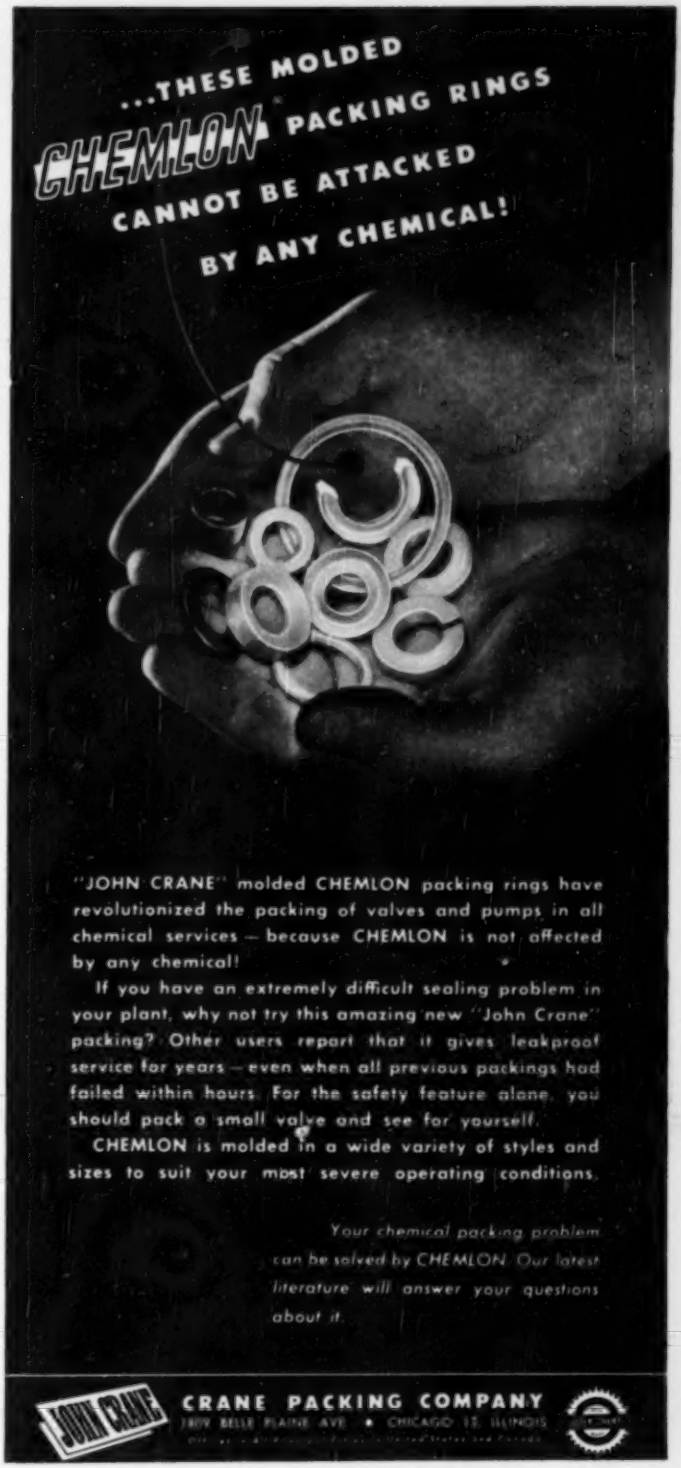
The Interstate Oil Pipe Line Co. is now using ammonia in treating

(Continued)

DESERVING OF BETTER THINGS

"I'm not ready to hand that fine word 'liberal' over to the Socialists or the nibblers, for 'liberal' comes from 'liber' meaning 'free,' and theirs is not the way to freedom."

ROBERT E. WILSON, *Chairman Standard Oil Co. (Indiana)*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If you have an extremely difficult sealing problem in your plant, why not try this amazing new "John Crane" packing? Other users report that it gives leakproof service for years — even when all previous packings had failed within hours. For the safety feature alone, you should pack a small valve and see for yourself.
CHEMLON is molded in a wide variety of styles and sizes to suit your most severe operating conditions.
Your chemical packing problem can be solved by CHEMLON. Our latest literature will answer your questions about it.
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CRANE PACKING COMPANY
1800 BELLE PLAINE AVE. • CHICAGO 13, ILLINOIS

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eight tanks at three pipe-line stations. Three tanks at Magnolia Station in southern Arkansas and two at Moore Station in northern Louisiana are receiving ammonia from bulk storage. The three remaining tanks under treatment are at the Yellowstone Station near Billings, Mont. Ammonia usage is economical, and is equally effective in both areas despite the great differences in climatic conditions.

F. T. Gardner and A. T. Clothier, Carter Oil Co., and F. Coryell, Interstate Oil Pipe Line Co., before the American Petroleum Institute, Nov. 8, 1949.

ULTRASONICS

. . . *Possibilities*

Dudley Thompson

Four suggested general methods for applying ultrasonic energy to chemical engineering fields: (1) as an analytical tool, (2) as an engineering tool, (3) as an extension of present unit operations, and (4) as an extension of present unit processes.

Applications include the determination of the properties of certain molecules, testing of materials, measurement of material thickness, determination of molecule size, and auxiliary uses in distillation, extraction, coagulation, oxidation and polymerization. Ultrasonic waves also can be employed to increase the rate at which chemicals react.

Unfortunately the requirements of chemical engineers in the field of ultrasonics have not yet been satisfied. The chief problems are the development of adequate ultrasonic generators, discovering the best operating conditions, designing accessory equipment, determining the methods and techniques to be employed and circulating the existing knowledge on the subject.

However the picture for the future of ultrasonics is not dim. Many industrial and academic laboratories currently are reported to be exploring the possibilities of utilizing the properties of high frequency sound waves.

D. Thompson, Virginia Polytechnic Institute, before the American Institute of Chemical Engineers, Pittsburgh, Dec. 7, 1949.

—*End*

THAT MAKES HIM UNIQUE?

"One of the greatest problems facing the banker and farmer is the farmer's increasing need for capital."

JOHN L. LILES, JR.,
Agricultural Economist
Federal Reserve Bank of Georgia

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Day in day out . . . year after year . . . for eleven years more than a million tons of rock smashed down and was carried along by a Quaker Ironsides Conveyor Belt. This 24" wide belt takes an impact drop of four feet and runs on a grade that starts at four feet off the ground to a height of fifty-five feet . . . carries 60 to 100 yards of material per hour. After a million tons, it is still good and ready for many more.

Whatever your belting need is in the Chemical Processing Industry . . . whether you are conveying soda ash, lime, clay or other material . . . power driving steam engines, steam turbines or electric motors with flat or V-belts . . . you can rely on Quaker for long performance-proved service. Every belt built by Quaker is thoroughly pre-tested in the plant . . . every type has been performance-proved on the job. To economize on belting, you'll find it pays to Quakerize your operations.

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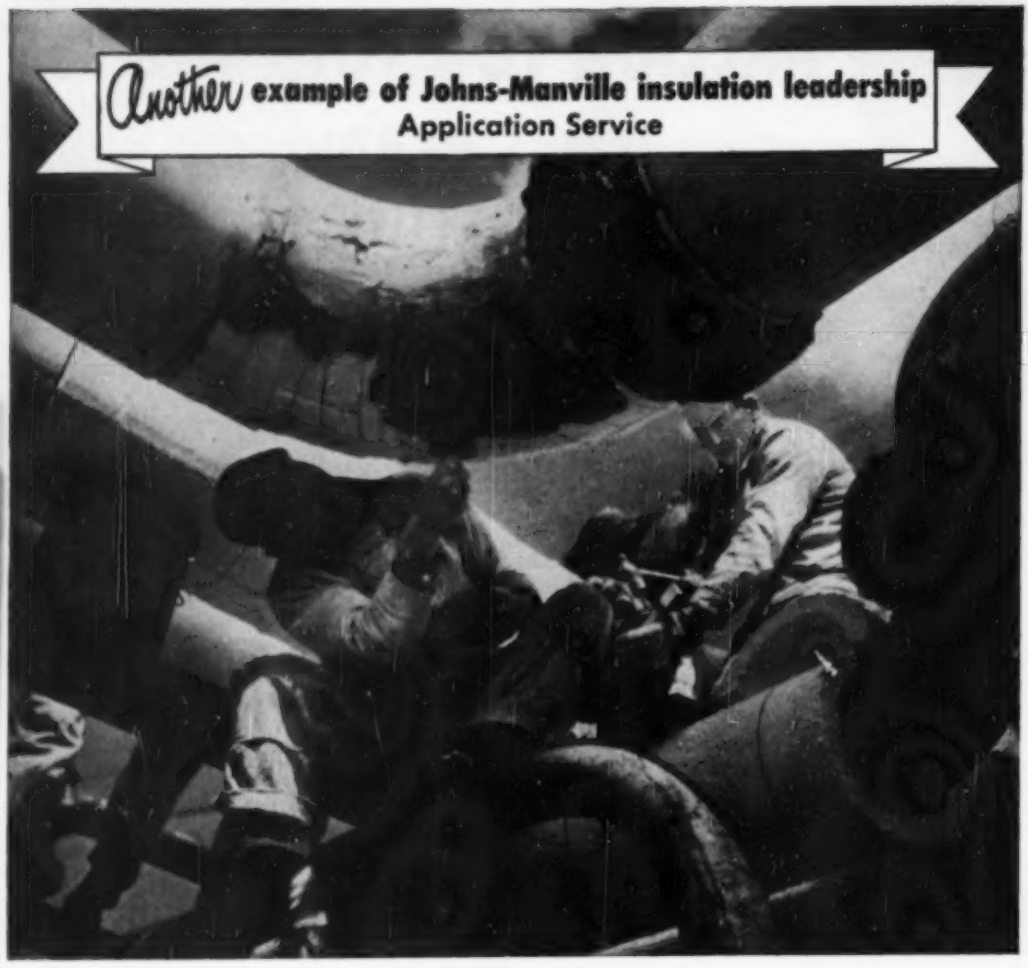

Bright future... for this insulation investment

Each day many men in industry ask themselves this question—*Just how should I go about getting the most out of each insulation dollar?* The answer, as with any investment, depends on several factors.

First, there's the reputation of the insulation manufacturer; the type of materials he has to offer; the efficiency of those materials in saving fuel. Next, there is the kind of service the manufacturer offers for engineering and applying his insulations.

This last consideration is a mighty important one. For, assuming all other things to be equal, it is the selection of the right insulation and the correct application of it that pays off in the long run on your insulation investment.

...And that's where Johns-Manville leadership in application service can be of utmost help to you. Your Johns-Manville Insulation Applicator selects the right materials for your specific job from the wide variety of J-M insulations that are available (for temperatures from minus 400F to 3000F above zero).

You will benefit by the long experience of your J-M Insulation Contract firm in all phases of insulation application . . . from engineering the job to the skill of his mechanics in applying the insulations.

If you have an insulation problem, write to the blue chip name for insulation investments—Johns-Manville, Box 290, New York 16, New York.

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Chemical Engineer's Bookshelf

LESTER B. POPE, Associate Editor

Scott Standen Encyclopedia

Chemistry and Technology Overlapping

ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY. Vol. 4: Cineole to Dextrose. Edited by Raymond E. Kirk and Donald F. Othmer. Assistant editors: Janet D. Scott and Anthony Standen. Interscience Encyclopedia, New York. 969 pages. $20.

American chemical industry can congratulate itself that the fourth volume of its encyclopedia has been published. It's true that without the enterprise of the publishers and perspiration of the editors the set would not be growing on industry's bookshelves.

But it is also true that the industry is helping itself. Traditionally secretive, chemical companies are more and more reaching the highly desirable viewpoint that to help all is to help oneself. They are cooperating (there are a few exceptions) with the editors. Company experts are allowed to use company time to prepare material for ECT—the Encyclopedia of Chemical Technology.

Behind the set are two of the best-known names in our field: Brooklyn Poly's Kirk (head, chemistry department) and Othmer (head, chemical engineering department). Theirs is the duty of selecting subjects, picking authors, keeping a supervisory eye on copy. But to others falls the duty of making contacts, prodding authors, correcting proofs and producing books.

The slightly nebulous and overlapping division of responsibility—chemistry vs. technology—of the editors-in-chief carries over to the assistant editors. Janet Scott for chemistry and Anthony Standen for technology.

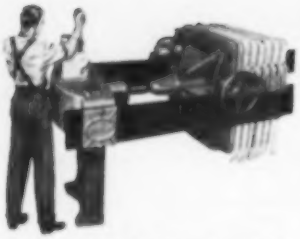
Miss Scott, the first full-time employee, joined ECT in 1944. Well-known in American chemical circles, Miss Scott is well equipped for her position. A Vassar graduate with a M.S. in chemistry from the University of Chicago, she worked for a number of years as associate editor of *Chemical Abstracts*. During the war she held positions with CWS, Basic Magnesium and Calco. As a rabid ski enthusiast and aviatrix with a private pilot's license, she literally, but not figuratively, has trouble keeping her feet on the ground.

In our Vol. 4 Miss Scott took care of such sections as Cosmetics, Coumarone, Coordination Compounds, Cyanides and Cyanine Dyes. Cyanides (66 pages) is one of the longest sections in the book. It includes inorganic cyanides, cyanates, thiocyanates and a few other cyanogen compounds. Cyanine Dyes rate 12 pages by a couple of Eastman Kodak's men. There is little in the literature on these compounds that are important as photographic sensitizers. Cosmetics is another long survey type of article full of information—and recipes.

Co-assistant-editor Standen takes care of procuring, polishing and publishing such sections as Conveying and Corrosion. The former, by the well-known W. G. Hudson, is a fine round-up of this part of materials handling. Corrosion, by W. D. Robertson of the Institute for the Study of Metals, gives facts and theories quite adequately for this $6-billion topic. Colloids, written by authority Glasstone, is a fine intelligible survey on the subject. Under Clays, Mr. Standen and the reader finds the volume and quality of material reflects the attitude of the producing companies. They are a little less reticent than strictly chemical companies about telling what they know. Coal is a 49-page exposition on the raw material for nylon (with air and water) and important industrial chemicals. (Without it we would have "brownouts," cold homes, cold coke ovens, cold blast furnaces.) Mr. Standen also was assigned Editor Othmer's only contribution ECT (so far): the 27-page Data section. Engineers will find this eclectic article worth perusal. It deals with the methods of presentation and correlation of data; also evaluation, interpolation, extrapolation.

Mr. Standen's background is international. Born in England, his father was British, his mother American. He got his degree in chemistry at Oxford, in chemical engineering at Massachusetts Institute of Technology. He worked ten years for Imperial Chemical Industries in England, Spain and Brazil. He came back to the United States in 1939 and has taught at the University of New Hampshire and at St. John's in Annapolis. He joined ECT in early 1946. An authority on insecticides, he wrote a non-best-seller "Insect Invaders" in 1943. His newest book "Science Is a Sacred Cow" has just been published.

So Scott and Standen are the pair responsible in large measure for the books that are already becoming thumb-worn not by abuse but by use. Interscience Publishers may not have a gold mine in their subsidiary, Interscience Encyclopedia, Inc., but its small staff is doing a mighty worthwhile job. The 12 volumes (not 10 as originally announced) will be a real record of American know-how.—*LBP*



After the hand-wheel has advanced the screw into contact with the thrust block, a few strokes of the hand pump lever advance the hydraulic ram to assure absolute tightness of the press, as much as 60 tons closing pressure. All this takes but a minute. And opening the press is just as easy.

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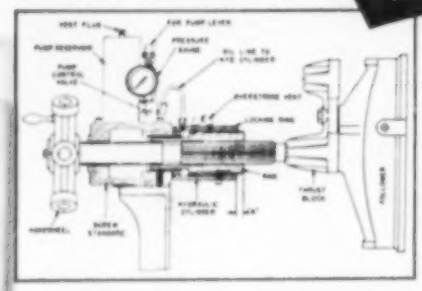

Easy to install at moderate cost on any Shriver 24" or larger filter press, the Hydro-Kloser definitely ends the back-breaking job of manual closing, reducing possibility of accidents. It quickly pays for itself in shortened closing time, convenience, better labor satisfaction, faster filtering cycles. It makes your present manually closed filter press practically automatic. Write for Bulletin.

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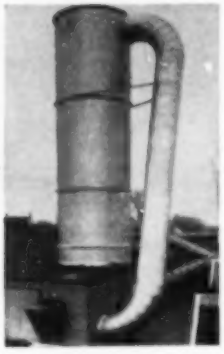

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SCHNEIBLE

BOOKSHELF, cont. . .

Let No Damn Fool

LABORATORY FRACTIONAL DISTILLATION. By Thomas P. Carney. The Macmillan Co., New York. 259 pages. $5.75.

Reviewed by Donald F. Othmer

Twenty-five years ago an outstanding organic chemist who had, himself, made tremendous contributions to laboratory distillation practice had a favorite saying regarding what to him was an art. "What a good chemist has separated, let no damn fool put together again." In other words everything that came over the top of the column should be removed; and he saw no reason for reflux!

Already in those days very efficient plant fractionating equipment was available; but nothing of any comparable efficiency was known in the laboratory, for analysis, for preparation of small amounts of materials, for developing processes for manufacture of materials, or for developing distillation processes per se. In the time between, there have been developed equipment, techniques and theoretical methods, which allow the same efficiencies in separating operations in the laboratory as in the plant. The object of this book is to present many of these methods, designs of apparatus, and techniques, primarily for laboratory workers. There is also a presentation of the theory and practice of distillation based on material balances for some of the simpler cases of design; and the author has discussed azeotropic and extractive distillations and molecular distillations as well as some other aspects of the distillation art, science, and practice as applied to laboratory needs and operations. Indeed a careful study of the book will give much of the fundamental background to the student of distillation which is common to both the laboratory and the plant.

The compilation from hundreds of references, particularly in the American technical literature, is a very major service, primarily to the chemist who is concerned with use of distillation tools and techniques without wishing to peruse all of the periodical literature of the last 20 years in this field. The presentation is straightforward; and the 130 drawings are clearly drawn and well illustrative of the text. The book is well organized and well bound.

This is a major contribution to the chemist in his use of distillation equipment for the preparation of pure compounds and to the engineer who is designing distillation processes. It is almost a treatise on the laboratory

aspects of the subject; and while no such book can be complete, the selection of material is excellent. It should be on the desk of many chemical engineers in development and pilot plant work and every chemist concerned with distillation. It will be a worthy educating influence to those that do not understand reflux, and other distillation principles.

Mendeleyev Modernized

TRILINEAR CHART OF NUCLEAR SPECIES. By William H. Sullivan. John Wiley & Sons, New York. 6 accordion fold-outs. $2.50.

The chart presents the systematics of and physical constants data for experimentally identified nuclear species. All information available by June 1949 has been included.

When assembled, the chart is a single continuous 10½-in.-high strip. It comes as six 32 by 10 accordion fold-outs bound in cardboard. Color is used to distinguish between natural and artificial nuclides and between beta and alpha instability. A full explanation is included of the trilinear coordinate graphic arrangement.

While preparing the chart, the author was affiliated with Clinton Laboratories and then the Atomic Energy Commisison.—*FA*

Electrodeposition

PRINCIPLES OF ELECTROPLATING AND ELECTROFORMING. Third edition. By William Blum and George Hogaboom. McGraw-Hill Book Co., New York. 455 pages. $6.

Reviewed by A. H. Pope

It took the authors a long time to revise their book but we must allow that when they did get to it they did an excellent job. While the book is still a basic text for electroplaters the

(Continued)

RECENT BOOKS RECEIVED

Coal, Coke and Coal Chemicals. By P. J. Wilson & J. H. Wells. McGraw-Hill. $8.

Deformation and Flow. By M. Reiner. H. K. Lewis (London). $6.50.

Frontiers in Colloid Chemistry. Ed. by R. Burk & O. Grummitt. Interscience. $4.

Fundamentals of Detergency. By W. W. Niven, Jr. Reinhold. $5.50.

An Introduction to Luminescence of Solids. By H. W. Leverenz. Wiley. $12.

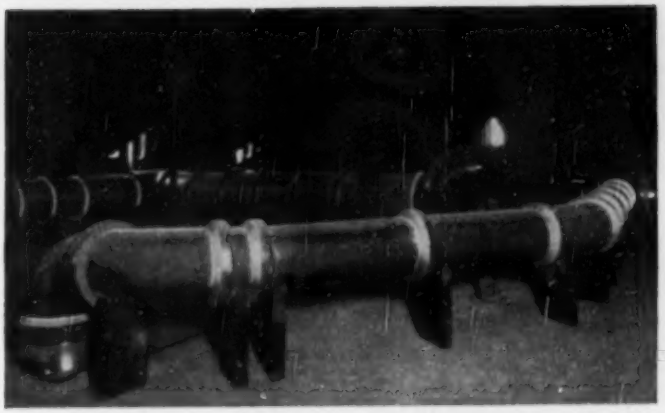
Introductory Chemistry. By C. W. Wood. MacDonald. $1.05.

Patent Practice & Management. By R. Calvery. Scarsdale Press. $5.

Polishes—Their Raw Materials and Manufacture. By J. Davidsohn. Leonard Hill (London). 15s.

Practical Report Writing. By S. S. Santmyers. International Textbook. $2.75.

Quantitative Ultramicroanalysis. By P. L. Kirk. Wiley. $5.



Knight-Ware Ventilating Pipe and Fittings in the Hall of Chemistry at West Virginia University.

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* Only known exceptions: Hydrofluoric acid, hot caustics.

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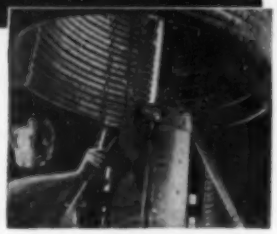

Aerofin manufactures finned heat-transfer surface exclusively. The experience gained by such specialization permits the selection of just the right surface and materials for each particular job — for each application.

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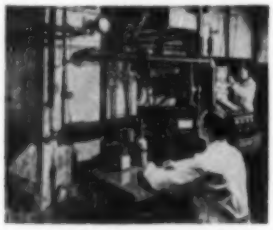

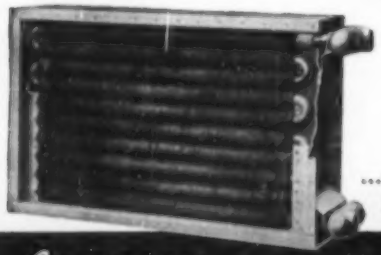

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contents have been modified to keep pace with the growth of electrodeposition as a science. Throughout the book recent developments dealing with the electroplating and closely allied fields are included in the discussion.

Background chapters to aid the nontechnical beginner have been retained but the theoretical aspect of plating has received additional attention with more comprehensive discussions of polarization, overvoltage, cathode films, throwing power and other basic concepts essential for a thorough understanding of electrodeposition. Also, appreciably more attention has been focused on plate specifications and allied subjects. Methods of analysis of plating solutions have been brought together in one chapter for easy reference rather than distributed in the various chapters on plating baths.

The chapters devoted to plating baths and processes have seen the greatest revision. The various baths are grouped according to the periodic arrangement of the deposited metals rather than in the order of importance. Virtually all commercially used plating baths, including the very latest, are acknowledged and discussed to the extent merited by their importance. To illustrate this coverage: copper bath information covers the acid sulphate, fluoborate, alkane sulphonate, pyrophosphate, amine, and the ever-present cyanide baths.

In every respect the revised Blum and Hogaboom lives up to, and will enhance, the excellent reputation established by the two previous editions.

New Developments

CONVEYORS AND RELATED EQUIPMENT, Second edition. By Wilbur G. Hudson. John Wiley & Sons, New York. 468 pages. $7.

Reviewed by William L. Gaya

This work is unquestionably a treatise of great value to the man who must plan a complete plant from raw materials to shipping finished product, who needs a reputable guide to the selection of proper equipment without recourse to the tedious process of consulting the manufacturer and sifting a miscellany of information for usable facts.

The title is modest in scope because the author has covered the application of the industrial truck-trailer systems, etc. and their place in the handling picture. This subject is of great value when covered in a treatment of conveying equipment be-

cause it causes thought to be given to one of the great misapplications of conveyors in the past, the intermittent handling of unit loads or bulk material.

Each type of equipment is explained and described mechanically and functionally in a thorough and methodical manner, making this work an excellent textbook for the student.

The data on pneumatic and hydraulic handling are of great value, and the chapter on dust explosion hazards completes the entire subject excellently.

Continued From Vol. 1

SYNTHETIC METHODS OF ORGANIC CHEMISTRY. Vol. II. By W. Theilheimer. (Translated by A. Ingberman.) Interscience Publishers, Inc., New York. 324 pages. $7.50.

Reviewed by Edgar A. Steck

This volume is a continuation of the painstakingly thorough task which Dr. Theilheimer planned for the culling of chemical literature to form an active guide to preparative methods. It is as carefully assembled as the previous volume, and follows the same general scheme for classification which has proven so helpful to users.

There is a cumulative subject index to Vols. I and II for those who do not wish to search both books for the appropriate classes of reactions. To prove further that an excellent book may be improved, this volume has all reaction-symbols clearly placed at the top of each page. While the German original did have this guide, the translator of the first volume had neglected to give the printer additional work. Dr. Theilheimer collaborated in the translation of this volume, which covers European literature for 1945-46 since most other sources were unavailable at the time of compilation. Since the author has certain obligations to the Swiss publishing firm which has handled the originals, no translation will be made of the third and fourth volumes of the work. It is hoped that there will be an ever-widening circulation of this valuable organization of data which is being provided for organic chemists who find the practice of their scientific art more stimulating than additional time spent in accumulating great files on reactions.

There are essentially no errors in the sections of the book which have been checked. It may be noted, however, that an inconsistency in nomenclature of acridines does occur. This is less the fault of the author than that of the workers in the field, who have not agreed upon one system

(Continued)

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6. Cleaner
7. More Durable
8. Easier To Apply
9. Precision Pipe Fit
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A manufacturer requiring good limestone has only to look at Oklahoma - - and he will find what he needs. For limestones are widely distributed over the entire state.

In the Arbuckle Mountains, limestone deposits have a combined thickness of about 8,000 feet (if the dolomites are included). Physically, Oklahoma limestones range from friable or chalky to stone with maximum crushing strength; from coarsely crystalline to very fine-grained; and from minutely oolitic to coarsely pisolitic. Chemically, they range from impure stone suitable for woolrock to chemical grade.

Oklahoma limestone is being utilized extensively for many purposes. Its quality and availability merit consideration for a multitude of additional uses.

TYPICAL ANALYSIS
(26 feet)

	Percent
CaO	54.760
MgO	0.680
SiO_2	0.143
Fe_2O_3	0.074
Al_2O_3	0.174
P_2O_5	0.007
SO_3	0.008
Ignition loss	43.940
Total	99.786

Detailed information on Oklahoma's mineral resources is available on request, based on data by the Oklahoma Geological Survey. Map showing location of mineral deposits is also available.

of numbering the acridine ring system. It is understandable that the British system should have been employed in both the original and the translation, for the literature covered in the field was almost exclusively from England. The U. S. did follow the British nomenclature until 1937, but since then the German system has been used in *Chemical Abstracts*.

It may be added that Dr. Theilheimer has been aided in his recent efforts through grants in money and facilities by a number of American firms. This friendly and generous gesture should not go unmentioned, for all users of the work will owe them a debt of gratitude. It is in accord with the best traditions that such be done.

72 in 889

COLORIMETRIC METHODS OF ANALYSIS. Third Edition, Vol. II (Inorganic). By Foster Dee Snell and Cornelia T. Snell. D. Van Nostrand Co., New York. 950 pages. $12.

Reviewed by M. E. Auerbach

The authors of this well-known vade mecum of the analyst present a valuable new selection of available colorimetric methods for the estimation of minute amounts of inorganic materials. Thirteen years have elapsed between the previous and the present edition. The growing importance of colorimetric analysis in the inorganic field is reflected in the expanded scope of the book. The second edition devoted 716 pages to 64 subjects; the new edition covers 72 subjects in 889 pages, the subjects consisting of the various metals and a few nonmetals. Test methods for indium, gallium, germanium, zirconium, tantalum, osmium, and lanthanum were lacking in the previous edition. These metals command 25 pages in the new edition.

No attempt has been made to cover the literature after 1947. It is noted that of the 2,156 references to original literature, 370 (or about 17 percent of the total) date from 1945-1947 inclusive. The relatively large number of these late references, even more than its greater size, are important to the potential buyer of the handbook. Incidentally, an impressive number of the references are taken from Russian journals.

It is interesting to note that a full third of the book, and approximately a third of the references, are devoted to five elements: phosphorus, iron, copper, lead and potassium. The chapter on lead gives a good indication of the scope of treatment of these im-

portant substances. Thus, detailed sample preparation methods are given for the estimation of lead in metals, alloys, minerals, water, biological materials, foods, dyes, medicinals and household products. Standards, reagents, interferences, separations and sensitivities are well covered for each of a number of procedures.

In their preface, the authors state their intention of hold to a middle course between the extremes of a "highly personalized and non-inclusive" text and a non-selective "mere collection of methods." However laudable the virtues of moderation, it would seem desirable and proper for widely experienced and respected writers, such as the Snells, to indicate preferences based upon direct experience. This minor criticism does not alter the reviewer's strong recommendation of "Snell and Snell" to all laboratories interested in colorimetric analysis.

Stimulus

FREEZE-DRYING: DRYING BY SUBLIMATION. By Earl W. Flosdorf. Reinhold Publishing Corp., New York. 280 pages. $5.

Reviewed by S. J. Friedman

This is the first American book treating drying by sublimation, one of the many processes whose rapid development was a direct result of the recent war and whose importance has dwindled somewhat since—principally because of unfavorable economics. It is provocatively written in an easy-reading style with an abundance of illustrations.

In his preface, the author states that the purpose of the book "is to bring together all technical knowledge as well as much heretofore unwritten know-how" for "those conducting freeze-drying in research and other laboratory and industrial work in microbiological, serological, immunological, histological, chemical, pharmaceutical, engineering and related fields." Mr. Flosdorf has undoubtedly achieved his purpose in many of the fields to which his book is directed, although his failure to consolidate and present in a logical and orderly manner much of the available information on the engineering and physical chemical aspects of freeze-drying will be a disappointment to many engineers who read this book.

The book consists of six chapters. The introduction reviews the history of freeze-drying, particularly as applied to biological products. The second chapter, devoted to basic prin-

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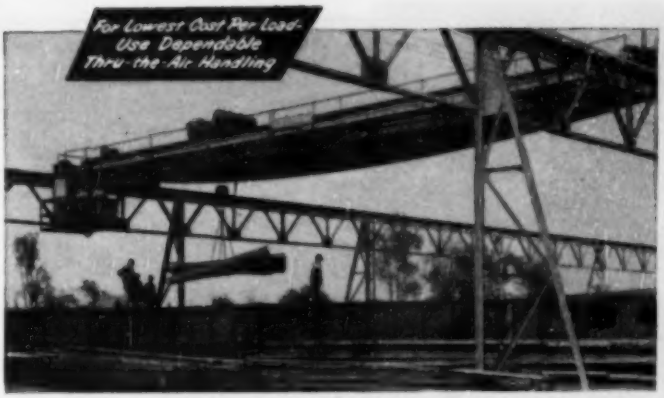

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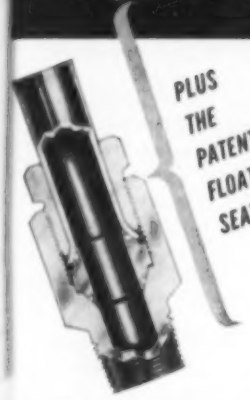

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ciples, is primarily valuable for the know-how which is included. The quantitative relationships regarding drying, heat transfer, and vapor flow in a vacuum are not always accurately and precisely stated. It is recommended that those seriously interested in these phases of freeze-drying consult standard texts on vacuum technology, heat transfer, and drying as well as the works of Greaves, Bradish, Morse, and Schwartz et al. rather than rely upon the information presented in this chapter.

Perhaps the most interesting chapter in the book is the third which deals with applications. The biologist and pathologist will find a wealth of information carefully compiled. Likewise, many promising applications to the drying of food products are described. Chapter 4 briefly discusses changes in products during desiccation from the frozen state and in storage.

Chapter 5 describes in detail typical equipment used for medical products. Although this information will be of greatest interest to medical laboratories and supply houses, the sections devoted to the development of the equipment and the operating techniques and tricks will prove fruitful reading for those interested in industrial applications.

The last chapter, which is concerned with equipment for foods, is limited in scope and very brief. This is unfortunate since it is in this and allied industrial fields that future large-scale applications of freeze-drying may be expected. Included in the Appendix are (a) a list of pertinent patents, (b) a description of Sherwood's studies on penicillin (which suffers from the editing of the author), and (c) a description of a method for imbedding tissues in polymethyl methacrylate plastics.

In general the book almost appears to be a collection of individual monographs arranged as chapters rather than a single treatise. This makes reading of any chapter easy but results in considerable repetition throughout the book. For the same reason information on some subjects is often scattered throughout the several chapters. It is believed that, in all fairness, the author should have included many more references to the work and the equipment of his competitors, such as the National Research Corp., which is not mentioned by name in this book.

The author is to be commended for his interesting explanation of the applications, techniques, and equipment for drying by sublimation. It is felt that, despite the fact that a good book on the engineering features of freeze-drying is still needed, the author has certainly fulfilled his hope of providing a stimulus to further research and application in this field.

Recent Books & Pamphlets

Designing with Aluminum Extrusions. Published by Reynolds Metals Co., 2500 South Third St., Louisville, Ky. 138 pages. Gratis. Eight principles of design are illustrated and explained with diagrams, charts and pictures of actual parts. Photographs and sketches show numerous examples of extrusion design. A 22-page tabular section presents data on chemical, mechanical and physical properties of aluminum.

Dimensional Analysis. By Nelson F. Murphy. Engineering Experiment Station Series No. 73, published by Virginia Polytechnic Institute, Blacksburg, Va. 41 pages. Chapters cover units and dimensions, method of dimensional analysis, elimination of trial and error calculations, similarity, dynamic similarity.

Seventeenth (1949) Annual Report of the Engineers' Council for Professional Development. Published by Engineers' Council for Professional Development, 25-37 West 39th St., New York 18, N. Y. 46 pages. Includes the chairman's report, reports of standing committees and of

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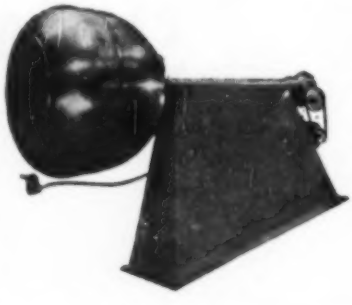

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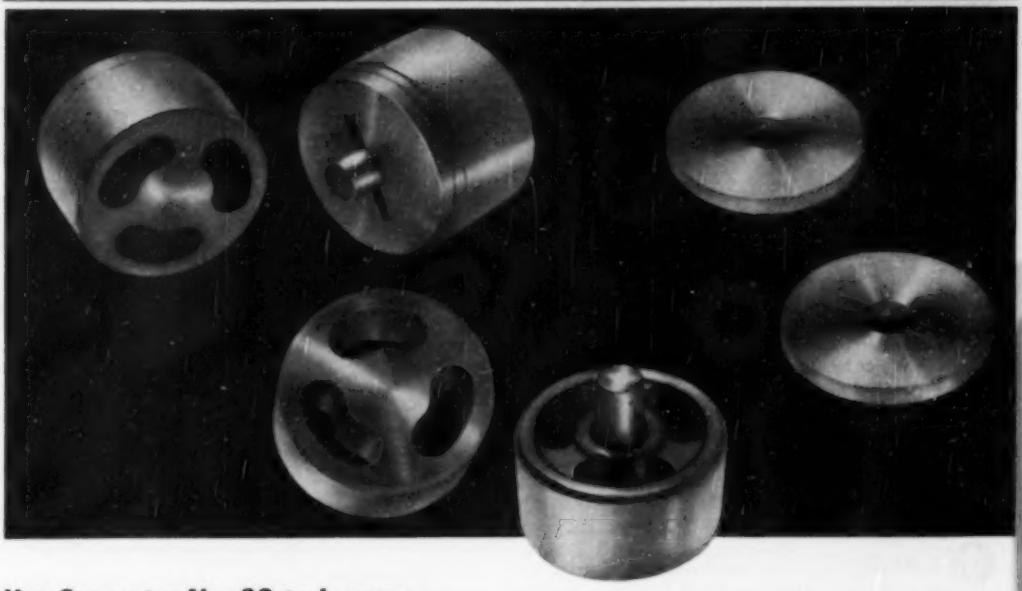

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FURFURAL FACTS for ENGINEERS

One of these days your chemists are likely to ask you to help them evaluate a project involving the use of furfural. This chemical is steadily expanding into new fields and many concerns have already found profitable uses for it. Here are facts about furfural to help you evaluate that new process.

1 Recovery:

Furfural is readily recovered from an aqueous solution by steam stripping; it may be recovered from non-aqueous solutions either by flash vaporization, straight distillation, steam stripping or extraction with water. Furfural may be recovered from gases either by cooling or by scrubbing with water. The recovery costs are low and losses are surprisingly small.

2 Storage and Handling:

Furfural is shipped in tank cars and is stored in steel tanks. While it is subject to slow autoxidation, special precautions to exclude oxygen are rarely required. It is not necessary to use special handling precautions for cold weather operation.

3 Stability:

Temperatures up to 230°C., are used in commercial installations; higher temperatures up to 280°C., have been reached but are not recommended. When operating at high temperatures, precautions should be taken to exclude oxygen from the system.

4 Materials of Construction:

The corrosion behavior of furfural-water mixtures is similar to that of mildly aggressive steam condensate. Materials of construction are usually determined by requirements of the other materials present in the process. While iron and steel are satisfactory for many applications, there are some applications for which copper, Everdur or stainless steel should be considered.

5 Safety:

The flash point of furfural is 56.8°C., and the lower explosive limit is 2.1 volume per cent in air. Neither vapor nor liquid are particularly toxic. However, the usual precautions in handling organic solvents should be observed.

Suggestion: *If you would like to know more about the properties of furfural we suggest that you ask for a copy of Bulletin 203. Reprints are also available describing a number of successful applications of furfural.*

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representatives of constituent organizations.

Symposium on Metallography in Color. Special Technical Publication No. 86, published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 64 pages. $4.50. Discussions of the various techniques used to record the characteristic colors seen visually. Ten color plates illustrate the material.

Liquid-Vapor Equilibrium Constants. Published by M. W. Kellogg Co., Chemical Engineering Division, 225 Broadway, New York 7, N. Y. $30. Two volumes of charts cover pressures graduated from atmospheric to 1,000 psia. for any mixture of hydrocarbons from methane to n-heptane, including unsaturates. Graphs are not only functions of temperature and pressure but are also a function of the composition of both the liquid and vapor phases.

Fugacity Charts for Light Hydrocarbons in Mixtures. Published by M. W. Kellogg Co., Chemical Engineering Division, 225 Broadway, New York 7, N. Y. $10. Graphs cover pressures from 1,000 to 3,600 psia.

Canadian Mineral Industry in 1947. Published by Bureau of Mines, Ottawa, Canada. 134 pages. 25 cents. Reviews of almost all metals and minerals produced in Canada in commercial quantities. Data on production and trade, uses and specifications and prices is included.

Paints. Selected Government Research Reports, Vol. 2, available from British Information Services, 20 Rockefeller Plaza, New York 20, N. Y. 70 pages. $1.25. Includes such topics as viscosity of paints and suspensions, temperature sensitive paints, and the effect of heating on the corrosion resistance of chromate treated and painted magnesium alloy castings.

Principles and Practice of Flow Meter Engineering. Seventh edition. By L. K. Spink. Published by the Foxboro Co., Foxboro, Mass. 416 pages. $7. Treatise on all phases of flow engineering.

Computing Return on Invested Capital: A Study in Machine Tool Arithmetic. Published by National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland 6, Ohio. 8 pages. Method for translating potential increased productivity (which would result from new machine tools) into potential yield on invested capital.

America's Arsenal Belongs Inland. Published by the Mid-Continent Industrial Council, 1030 Baltimore Ave., Kansas City 6, Mo. 8 pages. Summarizes advantages of locating industrial plants in and around Minneapolis, St. Louis, Kansas City, Dallas.

Safety Code for Manlifts. Published by the American Society of Mechanical Engineers, 29 West 39th St., New York 18, N. Y. 22 pages. Standard reference for construction, maintenance, operation and inspection.

Bibliography of Polarographic Literature. Published by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa. 103 pages. Gratis. Material is listed chronologically, ranging from 1903 to mid-1949, and alphabetically by subject matter and authors. Foreign titles have been translated into English.

Safety in Petroleum Refining and Related Industries. By George Armistead, Jr., Published by John G. Simmonds & Co., 111 John St., New York, N. Y. 425 pages. $10. Compilation of industry-wide data on accepted practices, equipment standards, inspection methods. Material is illustrated with numerous photographs, charts, flow diagrams.

Why Glycerine for Alkyd Resins and Ester Gums? Published by the Glycerine Producers' Association, 295 Madison Ave., New York 17, N. Y. 12 pages. Gratis. Tables give specific gravity, viscosity, freezing point, etc., of aqueous glycerine solutions at various concentrations; these properties are discussed with regard to their advantages in making alkyd resins and ester gums.

Foundry Science. By Harry A. Schwartz. Published by Pitman Publishing Corp., 2

(*Continued*)

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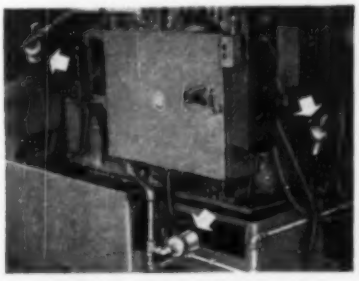

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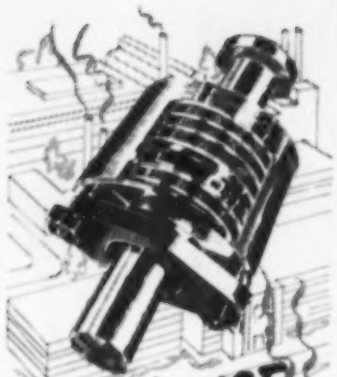

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Fatigue Allowance in Industrial Time Study. By Matthew A. Payne. Published by M. A. Payne, 12777 Euclid Ave., East Cleveland 12, Ohio. 66 pages. $2.50. Discussion of problems associated with purpose, determination and application of the fatigue allowance in industrial time study. Quotes the opinions of many engineers.

Chemical Industries. 22nd edition. By E. N. Tiratsoo. Published by Leonard Hill Ltd., 17, Stratford Pl., W. 1, London, England. 350 pages. 30s. This 1949 edition includes a new refrigeration section and enlarged classified and technical data indexes and an increased number of trade names and marks.

United Nations Scientific Conference on the Conservation and Utilization of Resources. By Robert S. Aries. Available from R. S. Aries & Associates, 26 Court St., Brooklyn 2, N. Y. 21 pages. Gratis. Discussion of technical assistance for under-developed countries through the "Point Four" program and overseas investments.

Liquefied Petroleum Gas: What It is—How It Acts. Published by the Association of Casualty & Surety Cos., 60 John St., New York 7, N. Y. Gratis.

GOVERNMENT PUBLICATIONS

The following recently issued documents are available at prices indicated from Superintendent of Documents, Government Printing Office, Washington 25, D. C. In ordering publications noted in this list give complete title and issuing office. Remittance should be made by postal money order, coupons, or check. Do not send stamps. All publications are in paper cover unless otherwise specified. When no price is indicated, pamphlet is free and should be ordered from bureau responsible for its issue.

Superphosphate. "Development of Process for Production of Concentrated Superphosphate." Tennessee Valley Authority, Chemical Engineering Report No. 8. Price 45 cents. Describes chemical engineering activities of TVA and work done to develop and improve processes and equipment for production of concentrated superphosphate from electric-furnace phosphoric acid and phosphate rock.

Tariff. "Tariff Changes." U. S. Tariff Commission has issued as an unnumbered Miscellaneous Series document the second supplement to U. S. Import Duties, 1948. This booklet gives the changes in import tariff rates which have been made since the complete list was issued.

Trade. "Operation of the Trade Agreements Program." U. S. Tariff Commission, report No. 163, second series. Price 25 cents. This is the second report covering April 1948 to March 1949.

Radioactive Isotopes. "Safe Handling of Radioactive Isotopes." National Bureau of Standards, Handbook 1142, 29 pages. Price 15 cents. Recommendations for the safe handling of artificially-produced radioactive isotopes in the typical laboratory or small industrial operation.

Atomic Weapons. "Medical Aspects of Atomic Weapons." Price 10 cents. A joint report of Atomic Energy Commission and the Department of Defense.

Standards. "Standard Samples for Science and Industry." Circular 498, National Bureau of Standards. Nearly 500 different

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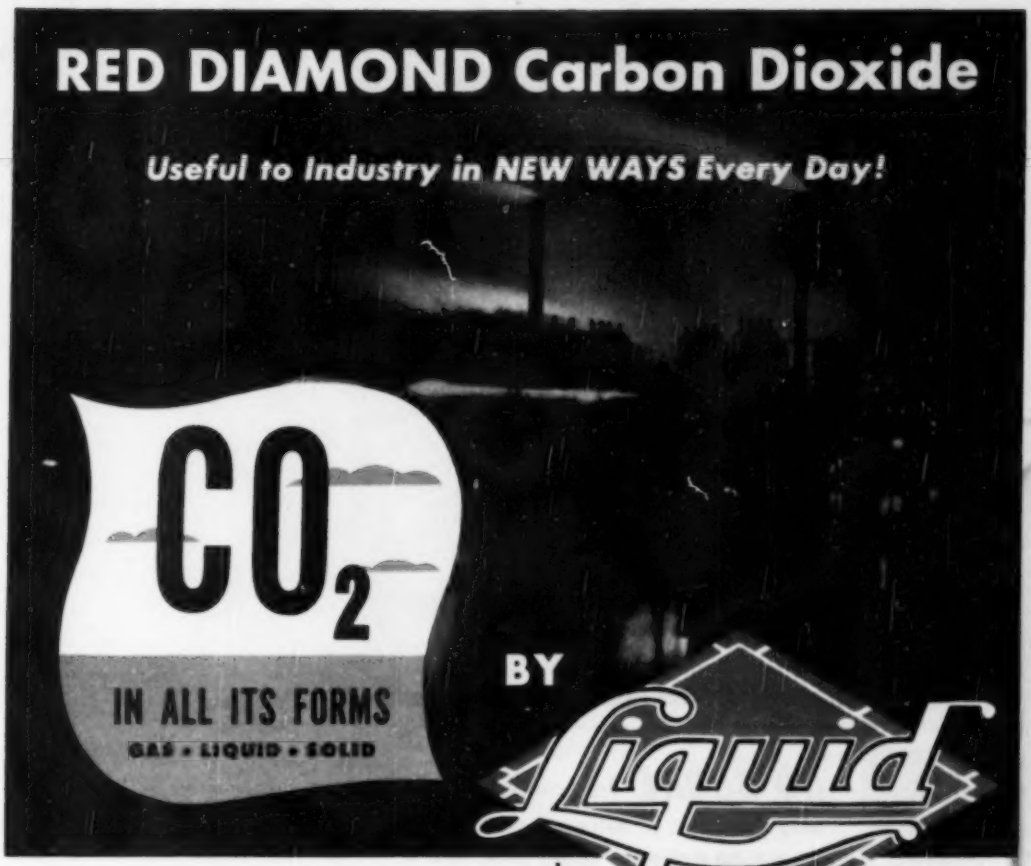

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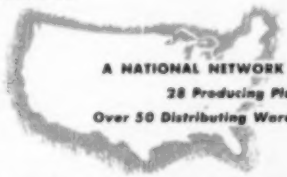

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Govt. Pubs., cont. . .

standard samples of chemicals, metals, ores, and ceramics as prepared, certified, and distributed by the National Bureau of Standards.

Limes. "Nomograms for Obtaining the Compound Composition of Hydrated Limes from the Oxide Analysis." By Ernest M. Levin. National Bureau of Standards. Miscellaneous Publication M196.

Rubber. "Synthetic Rubber." Recommendations of the President transmitted to the Congress, January 1950. An unnumbered document; price 40 cents.

National Associations. "National Associations of the United States." Department of Commerce. 700 pages, cloth bound. Price $3.50. A directory.

Water. "Quality of surface waters of the United States." U. S. Geological Survey Water-Supply Paper 1030. Price 40 cents. The fifth in the series of annual reports on quality of surface waters in the United States. Applies to data gathered or published in 1945. Later numbers of the series are in preparation.

Annual Reports. The customary annual reports of departments, bureaus, and independent agencies have been submitted to the Congress since it convened the first of January. All, or practically all, of these are available to inquirers on request direct to the institution of interest.

Oil Shale. "Index of Oil Shale Patents." By Simon Klosky. Bureau of Mines, Bulletin 468. Price $1.50.

Mine Equipment. "Effect of Temperature on Flame-Arresting Properties of Flat Joints in Explosion-Proof Mine Equipment." Bureau of Mines. Report of Investigations 4639. Mimeographed. Applies also to safety devices used in chemical establishments.

Coal Hydrogenation. "Special Equipment in the Coal-Hydrogenation Demonstration Plant." By J. A. Markovits, et al. Bureau of Mines. Report of Investigations 4584. Mimeographed.

Analysis. "A Method of Test for SO_2 and SO_3 in Flue Gases." By A. A. Berk and L. R. Burdick. Bureau of Mines. Report of Investigations 4618. Mimeographed.

Aviation Gasolines. "A Monometric Precision procedure for Determining the Vapor Pressure of Aviation Gasolines." Bureau of Mines. Report of Investigations 4635. Mimeographed.

Titaniferous Ores. "Proposed Process for Treatment of Low-Grade Titaniferous Ores." Laboratory Tests on Sintering with Carbon and Soda Ash to Produce Metallic Iron and Soluble Titanates. By R. T. MacMillan et al. Bureau of Mines. Report of Investigations 4638. Mimeographed.

Silica. "Laboratory Tests on Percolation Leaching of Silica from Bauxites." By M. L. Skow and J. E. Conley. Bureau of Mines. Report of Investigations 4649. Mimeographed.

Sillimanite. "Investigation of the Gideon Sillimanite Deposit, Spartanburg County, S. C." By H. G. Pooh. Bureau of Mines. Report of Investigations 4610. Mimeographed.

Mercury Ores. "Laboratory Concentration of Mercury Ores from Oregon, California, Idaho, and Nevada." By R. R. Wells. Bureau of Mines. Report of Investigations 4620. Mimeographed.

Minerals. "Minerals Yearbook." The annual volume issued by the Bureau of Mines for the calendar year 1947 is now available. Separate pamphlets for most of the chapters of the 1948 volume are also ready. Only mimeographed preliminary and partial data for 1949 have appeared. Most of these items will be issued during the last half of 1950.

Export. "Guide for the Prospective Exporter." An unnumbered report by Economic Cooperation Administration. A handbook on the principles of exporting designed especially for the small businessman interested in endeavoring to trade under the Marshall Plan. Obtain from ECA, 800 Connecticut Ave. N. W. Washington 25, D. C.

—End

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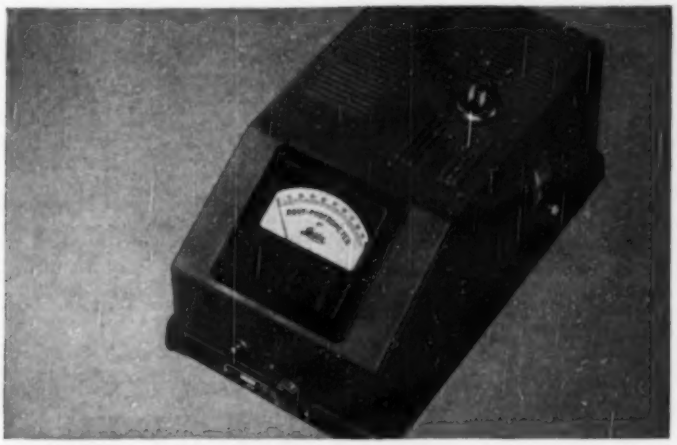

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Functional error cut to less than 0.1% by Leitz Industrial Rouy-Photrometer

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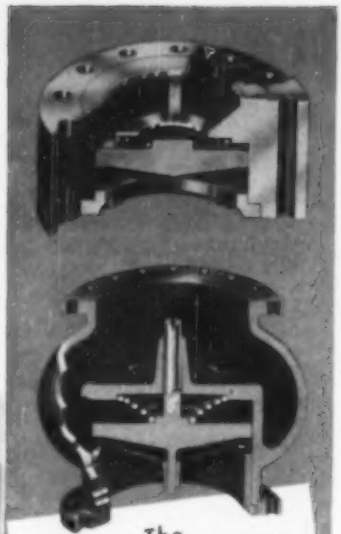
3. *Refer to your calibration table which indicates concentration of unknown for the particular reading.*



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MANUFACTURERS' LATEST PUBLICATIONS

For a free copy of any of these publications, check the item's number on the Reader Service Postcard inside the front cover.

(276a)
Agitators. Eclipse Air Brush Co., 390 Park Ave., Newark 7, N. J.—28-page booklet illustrates and describes a line of pneumatic agitators for batch mixing. Photographs show applications in industry.

(276b)
Demineralisers. Barnstead Still & Sterilizer Co., 2 Lanesville Terrace, Forest Hills, Boston 31, Mass.—20-page Catalog 123 covers operation and applications. Includes photographs of the entire line.

(276c)
Separators. Swartwout Co., 18511 Euclid Ave., Cleveland 12, Ohio.—12-page Bulletin S-14-C gives specifications and selection data on a line of helico-centrifugal separators for removing unwanted elements from steam, air and other vapors.

(276d)
Chromium Chemicals. Diamond Alkali Co., Cleveland 14, Ohio.—32-page booklet describes applications of such chemicals as bichromate of soda, chromic acid, sodium chromate, bichromate of potash.

(276e)
Process Equipment. Condenser Service and Engineering Co., 95 River St., Hoboken, N. J.—Four booklets cover various types of equipment made by this company. 24-page booklet describes operation and materials of construction of lube oil and jacket water coolers. Engineering data is shown on a series of charts. 12-page booklet covers steam jet air ejectors and accessories. 28-page Bulletin 441-C contains photographs and descriptions of a line of condensers. 24-page booklet covers centrifugal and piston pumps. Operating data, applications and construction of each model are given with the aid of cross-sectional drawings and performance charts.

(276f)
Water Conditioning. General Filter Co., Ames, Iowa. 12-page Bulletin 948 describes the theory of aeration in connection with water conditioning, including such factors as oxidation, odor removal taste removal, separation of gases from liquids. Cutaway line drawings show construction details of equipment.

(276g)
Instruments. Baird Associates, Inc., 33 University Rd., Cambridge 38, Mass.—8-page Bulletin XXX illustrates and describes an improved recording spectrophotometer. 12-page Bulletin XXXII covers the construction and use of spectrographs.

(276h)
Valves. Alloy Steel Products Co., Linden, N. J.—4-page Bulletin 3 contains cross-sectional drawings and dimensions of a line of jacketed valves for handling fluids that are difficult to move at room temperature.

(276i)
Steels. United States Steel Subsidiaries, 2150 Carnegie Bldg., Pittsburgh 30, Pa.—87-page booklet describes, with the aid of numerous charts and curves, the properties of steels for elevated temperature service. Includes a 4-page fold-out chart comparing properties of 21 types of steel.

(276j)
Distillation Equipment. Vulcan Copper & Supply Co., 120 Sycamore St., Cincinnati, Ohio.—8-page booklet covers the design of this company's distillation processes and equipment. Describes fabrication of equipment built of carbon steel, copper, stainless steel, nickel, Monel and other metals.

(276k)
Gas Compressibility. Worthington Pump and Machinery Corp., Harrison, N. J.—25-page Bulletin P-7637 entitled "Compressibility Charts and Their Application to Problems Involving Pressure-Volume-Energy relation for Real Gases." Charts cover the pressure-temperature range usually encountered in engineering practice.

(276l)
Furnace Pressure Control. Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.—12-page Catalog ND69-01-60(1) contains a series of illustrations and diagrams showing typical applications.

(276m)
Emulsifiers. Monsanto Chemical Co., Phosphate Division, St. Louis 4, Mo.—12-page Bulletin P-142 gives ten typical formulations of insecticide, fungicide and herbicide emulsifiable concentrates.

(276n)
Protective Coatings. R. M. Hollingshead Corp., Camden 2, N. J.—16-page Form No. 6243 describes the uses of a vinyl plastic strippable film. It can be applied with a spray gun and is suggested for protective packaging, rust and mildew.

(276o)
Speed Reducers. Cleveland Worm and Gear Co., 3273 East 80th St., Cleveland 4, Ohio.—8-page Bulletin 125 gives design and dimensions of vertical gear shaft worm gear speed reducers. Includes cross-sectional drawings of various models.

(276p)
Leak Detectors. Consolidated Engineering Corp., 620 North Lake Ave., Pasadena 4, Calif.—16-page booklet describes mass spectrometer method and equipment for leak detection. Various techniques are discussed and illustrated with schematic diagrams. Accessories, spare parts and specifications are listed.

(276q)
Scalper. Hewitt-Robins Inc., Robins Conveyors Division, 270 Passaic Ave., Passaic, N. J.—4-page Bulletin 131 illustrates and describes a vibrating machine for heavy duty scalping.

(276r)
Insulation. Infra Insulation, Inc., 10 Murray St., New York 7, N. Y.—44-page revised edition of "Simplified Physics of Thermal Insulation." Describes the use of this company's accordion pleated aluminum insulation.

(276s)
Corrosion Resistance. Duriron Co., Dayton 1, Ohio.—12-page Price List H-2 illustrates high silicon iron drain line equipment for handling acid wastes. 12-page Bulletin 1103 contains capacity tables and dimensional drawings for a line of fans for handling corrosive fumes. Sketches show construction details and typical applications.

(276t)
Instruments. Brookfield Engineering Laboratories, Inc., Stoughton, Mass.—4-page Data Sheet 012 illustrates and describes construction, operation and typical installations of an instrument for continuous and automatic viscosity control.

(276u)
Coupling. John Waldron Corp., Coupling Division, P. O. Box 791, New Brunswick, N. J.—4-page pocket-sized leaflet covers design, ratings and dimensions of gear type couplings.

(276v)
Pumps. Tabor Pump Co., 294 Elm St., Buffalo 3, N. Y.—1-page Bulletin CL-339 illustrates centrifugal pumps.

(276w)
Sprockets. Chain Belt Co., 1600 West Bruce St., Milwaukee 4, Wis.—16-page Bulletin 49-30 gives dimensions, specifications, list prices, sprocket style.

(276x)
Leak Detector. Vacuum-Electronic Engineering Co., 316 37th St., Brooklyn 32, N. Y.—4-page Bulletin LD-6 describes principle of operation and typical applications of mass spectrometer leak detector.

(276y)
Research. Henry W. Lohse, 277 Broadway, New York, N. Y.—A series of bulletins give Mr. Lohse's consulting qualifications in various fields. The first is on hydrogenation; second will be oxidation.

(276z)
Coolers. Young Radiator Co., Racine, Wis.—8-page Catalog 448 illustrates and describes vertical air discharge units for steam and vapor condensing, gas cooling, jacket water cooling, oil cooling. 16-page Catalog 1349 includes descriptions, ratings and features of construction of a line of jacket water coolers.

(276aa)
Sanitary Equipment. Specialty Brass Co., Kenosha, Wis.—4-page Bulletin 2-FB illustrates a line of stainless steel and nickel alloy fittings. 12-page Bulletin 9C contains capacity and specifications tables and sketches showing construction of a line of sanitary water and brine centrifugal pumps.

(276bb)
Conveyor Belts. Buffalo Weaving & Belting Co., Buffalo 7, N. Y.—6-page folder lists solid woven cotton belt sizes and prices.

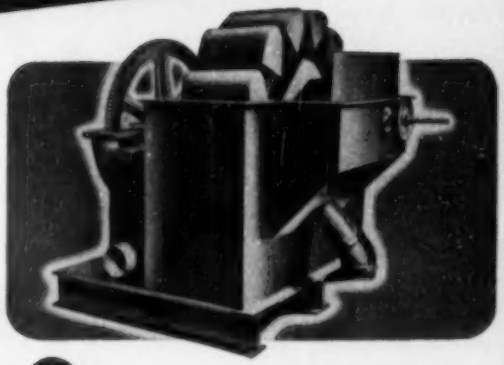
(276cc)
Ferrous Metallurgy. Tempil Corp., 132 West 22nd St., New York 11, N. Y.—Fourth printing of a wall chart shows

(*Continued*)

Complete Uniformity is "Run-of-the-Mill"

when you use TRAYLOR FEEDERS

Traylor offers two types of feeders to give mill operators complete control of either wet or dry feed with consequent uniformity of product size. Unless rate of feed to mills is carefully controlled, product size varies, becoming finer with slow feed . . . coarser when fed faster. Manufacturers of Portland cement and other products demanding rigid control of particle size are using Traylor feeders with consistent success.



TRAYLOR SLURRY FEEDER — A fully enclosed, self contained ferris-wheel type feeder. Supplies controlled feed of wet materials to rotary kilns and mills. Husky welded steel plate construction with hinged inspection door and clean out port. Heavy welded base plate provides support for motor and worm gear housing. Can also be driven by chain from kiln through a counter-shaft. Discharge rate is easily controlled by an adjusting wheel on the outside of housing. Built in sizes 3′ to 6′.

TRAYLOR TABLE FEEDER — This feeder provides close control of free flowing materials, both dry and moist. Easy adjustment changes rate of feed to mill, kiln or dryer. Table, supported on taper roller bearings, is turned by a worm with ball thrust bearings. All gears operate in oil in a dust proof chamber. Multiple installation will feed several materials in different proportions to the same machine. Built in sizes from 2′ to 6′.

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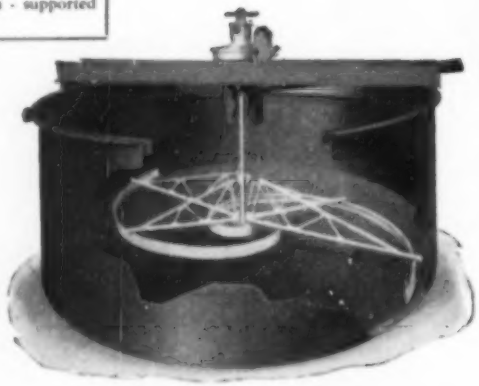
Illustrated above is a large-diameter, center-column Hardinge Thickener with concrete tank; below a smaller, steel tank, beam - supported unit.



Scraper breakage due to overloads is no longer a problem—at least not with the Hardinge "Auto-Raise" Thickener. An ingenious driving mechanism automatically lifts the entire scraping assembly upward when an overload occurs anywhere in the tank bottom. Another feature of this Thickener is its double-spiral scraper which removes settled solids rapidly—prevents "pile-ups". Write for Bulletin 31-D-11.

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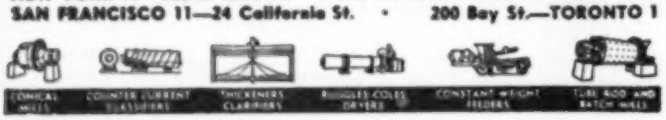


MFRS.' PUBS., cont. . .

working characteristics of steels in temperatures from −300 deg. F. to 2,900 deg. F.

(278a)

Disinfectants. Koppers Co., Chemical Division, Pittsburgh 19, Pa.—14-page Bulletin C-9-130-1 describes the uses of mono-tert-butyl-meta-cresol in formulating germicidal and disinfectant preparations.

(278b)

Surface Active Agents. M. Michel and Co., 90 Broad St., New York 4, N. Y.—2-page bulletin gives properties and uses of a modified alkyl aryl sulfonate liquid. Another 2-page leaflet covers a detergent which comes in flake or powder form.

(278c)

Speed Reducers. Falk Corp., Milwaukee 8, Wis.—Bulletin 1110 describes a line of parallel shaft sleeve bearing speed reducers.

(278d)

Propellers. Michigan Wheel Co., Grand Rapids, Mich.—4-page price list and discount schedule.

(278e)

Cement. Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.—Chart shows resistance of resin and silicate cements to 259 chemicals.

(278f)

Materials Handling. Lyon-Raymond Corp., 5664 Madison St., Greene, N. Y.—4-page Bulletin 440 illustrates the use of a line of hydraulic elevating positioners.

(278g)

Heat Exchangers. Davis Engineering Corp., 1064 East Grand St., Elizabeth, N. J.—4-page Bulletin 190 illustrates and describes an automatic self-cleaning white water heater. Includes a fully labeled sketch. Lists design and construction features.

(278h)

Motor Controls. Allen-Bradley Co., Milwaukee 4, Wis.—76-page fourth edition of a handbook giving dimensions and prices of this company's line.

(278i)

Speed Reducers. De Laval Steam Turbine Co., Trenton 2, N. J.—28-page Bulletin G-WB describes horizontal worm gear speed reducers. Gives standard specifications, horsepower ratings, dimensions.

(278j)

High Vacuum Equipment. F. J. Stokes Machine Co., Philadelphia, Pa.—4-page Bulletin 705 describes vacuum rotary dryers, shelf dryers, freeze-drying units, impregnators.

(278k)

Valves. Edward Valves, Inc., East Chicago, Ind.—4-page Bulletin 501 gives design details, dimensional data, material specifications and list prices for forged steel valves.

(278l)

Ball Bearings. New Hampshire Ball Bearings, Inc., Peterborough 1, N. H.—12-page Bulletin 50 describes a line of standard and special miniature ball bearings.

(278m)

Materials Handling. Hamilton Tool Co., Ninth St. at Hanover, Hamilton, Ohio.—4-page Bulletin P-50 illustrates and describes a portable elevating table. Includes specifications for standard models.

(278n)

Steam Generators. Edge Moor Iron Works, Inc., Edge Moor, Delaware.—8-page Bulletin G-491 illustrates and describes generators. Lists standard boiler equipment for all models and for heavy oil.

(278o)

Dryers. McNally Pittsburg Mfg. Corp., Pittsburg, Kan.—4-page Bulletin 1149 describes centrifugal dryer adaptable to several types of bulk materials. Discusses dryers' use for fine coal sizes.

(278p)

Protective Coatings. Wilbur & Williams Co., Greenleaf and Leon Sts., Boston 15, Mass.—4-page folder describes use of chemical resistant coatings for metal, concrete and wood.

(278q)

Plastic Tubing. U. S. Stoneware Co., P. O. Box 350, Akron 9, Ohio.—24-page Bulletin T-77 contains a series of charts showing chemical resistance of various tubing formulations. Illustrates and describes uses.

(278r)

Coal Dust Control. Aquadyne Corp., 220 East 42nd St., New York 17, N. Y.—4-page leaflet describes equipment and installation of a "wet water" system.

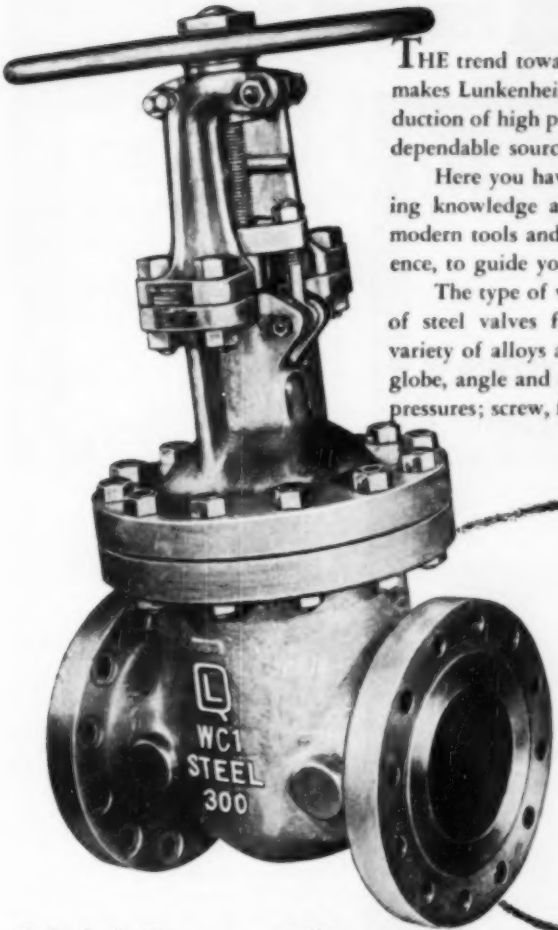
(278s)

Adhesives. National Starch Products Inc., National Adhesives Division, 270 Madison Ave., New York 16, N. Y.—18-page book-

(*Continued*)

FOR *Steel Valves* YOU CAN'T GO WRONG ON LUNKENHEIMER

This mark on steel valves is your assurance of highest quality



THE trend toward wider use of steel valves for many services makes Lunkenheimer, who pioneered the development and production of high pressure-high temperature designs, a logical and dependable source of supply.

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The type of valve illustrated is only one of a complete line of steel valves for every industrial purpose. Available in a variety of alloys and trims to suit specific applications . . . gate, globe, angle and check patterns, 150 lb. to 2500 lb. and higher pressures; screw, flange or welding ends.

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Fig. 1938-WD6

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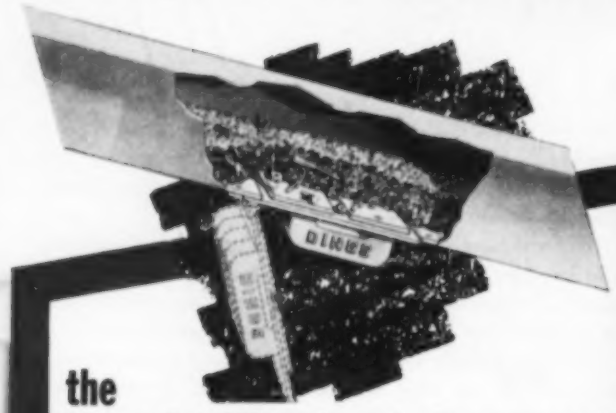

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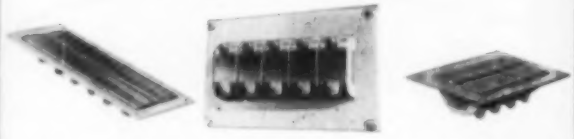

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Extra Strong—For extra heavy burdens or unusual quantities of iron.

CONSTANT protection at lowest cost. Effective tramp iron removal with no operating expense — no maintenance costs —no electrical accessories. The dangers of tramp iron permanently removed at *minimum* cost — these are the benefits of the Dings PERMA-PLATE.

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All Types of Electric and Non-Electric Magnetic Separators for Every Purpose.

MFRS.' PUB., cont. . .

jet discusses the handling of adhesives for transparent films. Includes a fold-out chart of commonly used transparent films. (280a)

Speed Reducers. D. O. James Gear Mfg. Co., 1140 West Monroe St., Chicago 7, Ill. —24-page Catalog 45-S gives general specifications, rating tables and dimensions for a line of worm gear reducers. (280b)

Dust Collectors. American Wheelabrator & Equipment Corp., 794 South Byrkit St., Mishawaka, Ind.—4-page Bulletin 252 covers the applications of dust collectors in the ceramics industry. (280c)

Extrusion. Tennessee Eastman Corp., Kingsport, Tenn.—28-page booklet covers equipment and choice and handling of cellulose acetate plastic and cellulose acetate butyrate plastic. Includes a suggested guide for correcting extrusion problems. (280d)

Protective Coatings. Dampney Co. of America, Hyde Park, Boston 36, Mass.—2-page flier describes a vinyl coating for protection of metal exposed to corrosive attack. (280e)

Materials Handling. Hewitt-Robins Inc., Robins Conveyors Division, 370 Lexington Ave., New York 17, N. Y.—4-page Bulletin 132 illustrates line of sectional conveyors. (280f)

Ball Bearings. Miniature Precision Bearings Inc., Keene, N. H.—8-page Catalog 49 illustrates and describes a line of ball bearings. Includes dimensions charts showing actual sizes. (280g)

Steels. Graver Tank & Mfg. Co., Inc., Stainless and Alloy Steels Division, 148th St. & Tod Ave., East Chicago, Ind.—4-page leaflet describes the fabrications of stainless and alloy steels. (280h)

Tanks. Graver Tank & Mfg. Co., Fabricated Plate Division, 148th St. & Tod Ave., East Chicago, Ind.—12-page booklet entitled "Evaporation Losses from Cone Roof Tanks" by R. C. Ulm. Data is plotted on several full page charts. (280i)

Rust Prevention. L. Sonneborn Sons, Inc., 80 Eighth Ave., New York 11, N. Y.—6-page folder describes a coating for metals to protect it against atmospheric conditions, salts, water, acid fumes and vapors. 4-page Bulletin 10 contains performance data on the coating. (280j)

Zircon. Millmaster Chemical Corp., 420 Lexington Ave., New York 17, N. Y.—5-page booklet covers properties, methods of using zircon and applications. (280k)

Protective Coating. Gates Engineering Co., P. O. Box 1711, Wilmington, Del.—4-page leaflet describes the applications of vinyl finishes. (280l)

Materials Handling. Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.—8-page booklet 1135 covers specifications and details of a 2,000 lb. capacity lift truck. (280m)

Insecticide. Monsanto Chemical Co., St. Louis 4, Mo.—12-page pocket-sized fold-out contains instructions for safe handling of parthion. (280n)

Blowers. Sandard Stoker Co., 370 Lexington Ave., New York 17, N. Y.—4-page booklet 86 contains a selection chart listing capacities of blowers when direct connected to standard speed motors. (280o)

Asphalt Coatings. Flintkote Co., Industrial Products Division, 30 Rockefeller Plaza, New York 20, N. Y.—1-page Bulletin I-C No. 221 describes a solvent type asphalt coating for trowel application. 1-page Bulletin I-C No. 222 describes a similar material for brush application. 1-page Bulletin I-C No. 229 describes a heavy consistency asphalt cement for repairing roofs. (280p)

Filters. T. Shriver & Co., Harrison, N. J. —4-page Vol. 1, No. 1, of the house organ "Filter Facts." Tips on the use of filters. (280q)

Pumps. Fairbanks, Morse & Co., 600 South Michigan Ave., Chicago 5, Ill.—16-page Bulletin 5400K-1 illustrates and describes a single passage bladeless impeller pump for sewage and trash. Cutaway drawings show details of construction. (280r)

Compressors. Clark Bros. Co., Bank Bldg.,

(Continued)

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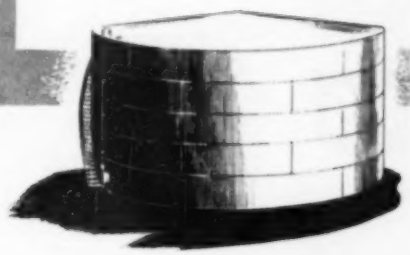

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Mfrs.' Pubs., cont. . .

Olsan, N. Y.—32-page collection of four articles on centrifugal and axial flow compressors. One is a report on the gas turbine's use as a prime mover on gas pipelines to drive centrifugal pipeline compressors.

(282a)

Heaters. Patterson-Kelley Co., East Stroudsburg, Pa.—4-page leaflet contains capacity tables and dimensions for copper silicon hot water storage heaters. Another 4-page leaflet covers hot water heaters and heat exchangers.

(282b)

Materials Handling. Lewis-Shepard Products Inc., 263 Walnut St., Watertown 72, Mass.—Bulletin 26 gives specifications and engineering features of a line of lift trucks in capacities from 500 lb. to 15,000 lb.

(282c)

Instruments. Taylor Instrument Cos., 95 Ames St., Rochester 1, N. Y.—16-page Bulletin 98154 illustrates and describes a line of time cycle controllers. Includes sectional views and application drawings.

(282d)

Reduction Mill. C. H. Wheeler Mfg. Co., Sedgley Ave. at 19th & Lehigh, Philadelphia 32, Pa.—8-page booklet illustrates and describes a fluid energy reduction mill especially suited to reduce particles to final sizes of from less than one micron to only a few microns.

(282e)

Screens. Bixby-Zimmer Engineering Co., Galesburg, Ill.—24-page catalog lists design details for vibrator, shaker conveyor, centrifugal, heat drier and rotary applications for round rod screens.

(282f)

Filters. T. Shriver & Co., 810 Hamilton St., Harrison, N. J.—4-page Bulletin 133 gives performance data, design and construction features and specifications for an enclosed type, horizonal plate pressure filter. Another 4-page leaflet describes other types of filter media available from this company.

(282g)

Generators. General Electric Co., Apparatus Dept., Schenectady, N. Y.—8-page bulletin deals with generators for standby, portable, and prime source power. Gives construction features, mechanical modifications and performance data.

(282h)

Welding Fittings. Tube Turns, Inc., Louisville 1, Ky.—262-page Catalog No. 211 is a complete reference work covering more than 5,000 items in this company's line of seamless welding fittings and flanges. Generously illustrated, most data is presented in tabular form. Some subjects covered are: short radius pipe bends, mitre welds, elbows and the effects of pressure and temperature on welded piping. Subjects are divided by index tabs. Distribution of the book will be restricted to major users, designers and erectors of industrial piping.

(282i)

Steam Boilers. Cleaver-Brooks Co., 326 East Keefe Ave., Milwaukee 12, Wis.—12-page booklet covers self-contained, oil and gas fired steam boilers. Includes diagramatic cross-section drawing of boiler.

(282j)

Materials Handling. Towmotor Corp., 1226 East 152nd St., Cleveland 10, Ohio.—4-page Bulletin 85 describes the use of this company's fork lift trucks and tractors in the Pfaudler Co.'s glass lined tanks plant.

(282k)

Pipe. Ric-Wil Co., Dept. J-1, Union Commerce Bldg., Cleveland, Ohio.—Catalog Section 480-4 describes manufacture, construction and installation of insulated piping. Section 480-5 covers specifications, structure, properties and installation procedures.

(282l)

Alloys. Cooper Alloy Foundry Co., Hillside 5, N. J.—6-page chart gives analysis of stainless, corrosion and heat resistant alloy castings.

(282m)

Instruments. Wheelco Instruments Co., Chicago 7, Ill.—4-page Bulletin F2-1 illustrates and describes a combustion safeguard for oil and gas fired furnaces, ovens, boilers, kilns and other heating equipment.

(282n)

Electrical Accessories. Trumbull Electric Mfg. Co., Plainville, Conn.—40-page Catalog TEB-1 describes the heavy duty members of a power distribution line which are used as main feeders. Covers construction details, accessories, engineering data and application information.

(Continued)

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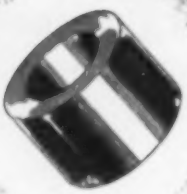

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MFRS.' PUBS., *cont.* . .

(284a)

Epichlorohydrin. Shell Chemical Corp., 500 Fifth Ave., New York 18, N. Y. 55-page booklet tabulates physical properties, including azeotropic data, of pure and commercial epichlorohydrin. Discusses chemical behavior, storage and handling.

(284b)

Refractories. Kaiser Aluminum & Chemical Sales, Inc., Chemical Division, 1924 Broadway, Oakland 12, Calif.—4-page leaflet illustrates the uses in industry of this company's industrial chemicals, refractories and alumina.

(284c)

Materials Handling. Yale & Towne Mfg. Co., Philadelphia Division, Roosevelt Blvd. & Haldeman Ave., Philadelphia 15, Pa.—4-page leaflet illustrates and describes a fork truck system of palletless handling.

(284d)

Motors. General Electric Co., Apparatus Dept., Schenectady, N. Y.—8-page Bulletin GEA-5426 illustrates and describes construction features and mechanical modifications of high-speed synchronous motors. Lists Applications.

(284e)

Speed Reducers. D. O. James Gear Mfg. Co., 1140 West Monroe St., Chicago, Ill.—44-page Catalog No. 40-B illustrates and describes parallel shaft, continuous tooth herringbone speed reducers. Dimensions and horse power ratings are given for each model.

(284f)

Hydrogen Peroxide. Buffalo Electro-Chemical Co., Station B, Buffalo 7, N. Y.—Physical data and properties. Lists reactions in organic and inorganic chemistry. Enumerates applications and uses.

(284g)

Instruments. Fischer & Porter Co., Hatboro, Pa.—8-page Catalog 61 illustrates and describes a line of chlorine dispensers. Sketches show design features.

(284h)

Chemicals. American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.—Collective Volume I contains a compilation of data on several new chemicals which have become available during the last year. They include aryl biguanides, dialkyl cynamides, glycolonitrile and potassium cyanate.

(284i)

Safety. Panalarm Products, Inc., 7218 North Clark St., Chicago 26, Ill.—4-page Bulletin 400 describes an alarm signal system for use in hazardous and corrosive atmospheric locations.

(284j)

Solvent. Process Chemical Specialties, P. O. Box 345, Beverly, Mass.—1-page Bulletin 1-50 covers properties, reactions and uses of a resin-chemical intermediate solvent.

(284k)

Flanges. American Pipe & Steel Corp., 220 Date Ave., Alhambra, Calif.—4-page leaflet describes a flange and flange cutter used for connecting pipes to the outside or inside of a tank. Contains instructions for use.

(284l)

Dust Collectors. Kirk & Blum Mfg. Co., 2838 Spring Grove, Cincinnati 25, Ohio.—4-page Bulletin 21M describes heavy duty portable dust collectors.

(284m)

Reagents. Jasons Drug Co., 1085-87 Myrtle Ave., Brooklyn 6, N. Y.—Bulletin describes ready-made reagents and solutions used in Sidney Siggia's book "Organic Analysis via Functional Groups."

(284n)

Hose. B. F. Goodrich Co., Akron, Ohio.—2-page leaflet covers paint spray hose and an all-purpose high pressure spray hose.

(284o)

Couplings. D. O. James Gear Mfg. Co., 1140 West Monroe St., Chicago, Ill.—8-page pamphlet gives dimensions and ratings of flexible couplings.

(284p)

Instruments. Hartford Machine Screw Co., Shomatic Division, P. O. Box 1448.

(*Continued*)

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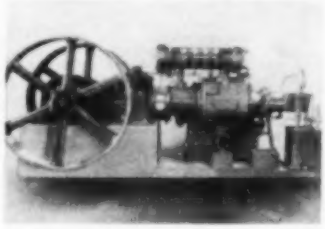

Every wearing part on this four stage air or gas compressor is designed for easy accessibility. Only one stuffing box is employed. Full-length and spacious water jackets surround not only the cylinders but also the ports and valve pockets, greatly reducing the heat generated by compression. For further data on this compressor, write for catalog.

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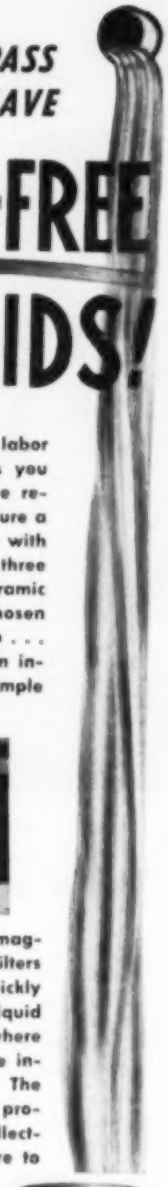

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MFRS.' PUBS., cont. . .

Hartford 2, Conn.—4-page leaflet illustrates and describes a glass liquid level gage.

(286a)

Electrical Specialties. Laduby Co., P. O. Box 1123, New Haven 5, Conn.—1-page flier on fluorescent lamp disposal.

(286b)

Instruments. Pure Carbonic, Inc., 60 East 42nd St., New York.—12-page catalog describes a line of carbon dioxide regulators and explains its operation.

(286c)

Instruments. Bristol Co., Waterbury 91, Conn.—4-page Bulletin DM027 describes air operated controllers for temperature, pressure, flow, liquid level.

(286d)

Insulation. Weyerhaeuser Timber Co., Longview, Wash.—Two 4-page folders cover the use of a fir fiber material for insulating cold storage and locker plants.

(286e)

Electrical Specialties. Baldwin Locomotive Works, Testing Equipment Dept., Edystone, Pa.—2-page Bulletin 306 gives specifications for a line of resistance wire strain gage type pressure cells.

(286f)

Process Equipment. Croll-Reynolds Co., 17 John St., New York.—15-page catalog describes and illustrates steam jet ejectors for high vacuum.

(286g)

Instruments. Selas Corp. of America, Philadelphia.—12-page booklet discusses design, construction and operation of combustion controllers.

(286h)

Motors. Sterling Electric Motors, Los Angeles, Calif.—4-page leaflet illustrates and describes a line of slow speed electric power drives.

(286i)

Materials Handling. Paul J. Kordes Co., 4701 North 125th St., Butler, Wis.—4-page leaflet illustrates and describes a line of dollies.

(286j)

Piping. Michigan Pipe Co., Bay City, Mich.—4-page leaflet contains data on corrosion resistant piping and lists chemicals which the various types resist.

(286k)

Centrifugal Fire Pumps. Food Machinery and Chemical Corp., Peerless Pump Div., San Jose, Calif.—24-page booklet illustrates and describes a line of horizonal centrifugal fire pumps.

(286l)

Instruments. Zenith Electric Co., 152 West Walton St., Chicago 10, Ill.—4-page catalog section describes impulse timer without gears and clutch for elevator starting, production line control, pilot circuit etc.

(286m)

Paper Coatings. Hercules Powder Co., Wilmington.—32-page booklet deals with nitrocellulose packaging and paper lacquers. Describes lacquer components, solvent, paper-coating method.

(286n)

Process Equipment. Troy Engine & Machine Co., Process Machinery Div., Troy, Pa.—Four 2-page fliers. Bulletin 1301 covers colloid mills; Circular 1101, high-speed, small production mills; Circular 1102, fourpoint adjustment, high speed three roll mills; Circular 1103, onepoint adjustment, high speed three roll mills.

(286o)

Motors. Louis Allis Co., Milwaukee 7, Wis.—4-page Bulletin 1000 contains a large cutaway drawing of this company's gearmotor.

(286p)

Rubber Linings. B. F. Goodrich Co., Akron, Ohio.—6-page catalog section 9020 features rubber-lined tanks. 8-page catalog section 9780 covers rubber-lined pipe, fittings and valves.

(286q)

Compressors. Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.—16-page Bulletin A-56 includes section drawings and parts photographs of two-stage, air cooled compressors.

—*End*

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Calcium Citrate	Construction	Slows the setting of cement and plaster.
Triethyl Citrate Tributyl Citrate Acetyl Triethyl Citrate Acetyl Tributyl Citrate	Plastics Industry	Plasticizers for a wide variety of synthetic plastics.
Itaconic Acid (Citric Acid less $CO_2 + H_2O$)	Paint and Varnish Industry	Shortens reaction time, gives harder finishes, improves color, shortens baking time of oil modified alkyds.
Itaconic Acid	Plastics Industry	Condensed with glycols or simply esterified, may be polymerized to form clear hard plastics.
Aconitic Acid (Citric Acid less H_2O)	Plastics Industry	For preparation of synthetic resins and plasticizers.
Tributyl Citrate	Textile	Anti-foaming agent.

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Chemical Economics

RICHARD F. WARREN, Market Editor

Coal Strife Cuts Into Output of Chemical Process Industries Again

To the many chemical processing plants using coal or its derivatives, the biggest news late in February was the rapid dwindling of coal supplies and the cut-backs in coal chemicals. For the second time in four months this problem has risen to plague consumers of these basic materials. It means that benzene will continue in short supply, along with most of the other coal chemicals.

Last year coke output—a yardstick of coal chemical production—dropped 15 percent. This was caused by a slackening in steel operations in the second quarter, the miners' three-day work week which started in July, and the steel and coal strikes that hit the industry last October. Since the steel industry takes about 81 percent of all coke produced, its ups and downs have a real impact on byproduct operations. Production of ammonium sulphate, excluding the tonnage from purchased synthetic ammonia, dropped 9 percent from 1948. Crude naphthalene fell 32 percent.

An interesting bit of information can be gleaned from the benzene statistics just released by the Bureau of Mines; production of industrial grades was off 16 percent in 1949. However, output of the motor grades was 73 percent higher than 1948 rates. This appears odd in view of the shortage that exists in industrial grades at the present time, but in the early part of 1949 there was a considerable slackening in industrial demand. As a result, sizable quantities were shifted to motor grades. Curtailment of cooking operations changed this situation and now units are pushed to supply maximum gallonage of industrial benzene from the crude light oil.

There are 85 active oven-coke plants in the United States. All of them make tar. About 64 make ammonium sulphate, 17 plants make ammonia liquor, 28 make naphthalene, 57 make benzene, and 55 units make toluene. About 50 plants make xylene, while only 34 units turn out solvent naphtha. Pyridine is produced at 28 plants and 6 make creosote oil.

Relief from the tight situation in these chemicals has come from imports in the past year and more imports of coal chemicals may be expected as western European countries strive to take advantage of the ready market while it lasts.

Aside from the shortages mentioned above, the supplies of most chemicals were adequate to meet the needs of industrial consumers. Even ethylene glycol has reached an equilibrium in the supply-demand picture. Carbide expansions at Whiting, Ind., and Institute, W. Va., will be operating late this year. Together with other post-war expansions in output of this chemical, production at the end of the year will force development of wider use outside of the anti-freeze market. Low cost alcohol has cut into the sales of permanent-type antifreeze this season.

Another damaging blow was the mild winter that existed in the densely populated northeastern states until late in February. Experts think that lower prices of permanent type antifreeze may be expected next year as a result of the combination of circumstances that will exist next fall.

Production Trends

Late in February the government released data on the December output of inorganic chemicals. All time production records were established by producers of ammonia, ammonium sulphate, chlorine, hydrochloric acid, hydrogen and sulphuric acid. It was the third record breaking month in a row for synthetic ammonium sulphate and hydrochloric acid. Several other chemicals topped November output but did not beat existing records. They included ammonium nitrate, calcium carbide, caustic soda, sodium bicarbonate, and some sodium phosphates.

With the final returns for the year tabulated, it is easy to see that production of inorganics in 1949 reflected trends in several basic fields. One of the most significant trends is found in phosphoric acid output. Last year phosphoric acid made from phosphorous exceeded the total domestic production of this acid in any years prior to 1944. While acid from phosphate rock has also grown steadily, its rate of growth has fallen behind the H_3PO_4 from elemental sources. One of the major factors in the continued growth of this basic chemical is the widening demand for many phosphate chemicals. Detergents alone are opening vast new markets for phosphates. At the same time demand for concentrated superphosphates has given it an added boost in fertilizers. (See *Chemical Engineering*, February, p. 99.)

The 1,765,128 tons of chlorine produced last year topped the 1948 rate by 144,000 tons to set a new record that will probably be surpassed in the coming year. The wide market for chlorine compounds has created considerable interest in its production trend curve. Some experts have suggested that it be used as a barometer to measure business conditions, but there is considerable doubt that any one chemical can be used as such a yardstick. Although some market researchers use sulphuric acid as a rough barometer, even that king of chemicals can not be used to accurately plot current or future conditions without supporting evidence drawn from other sources.

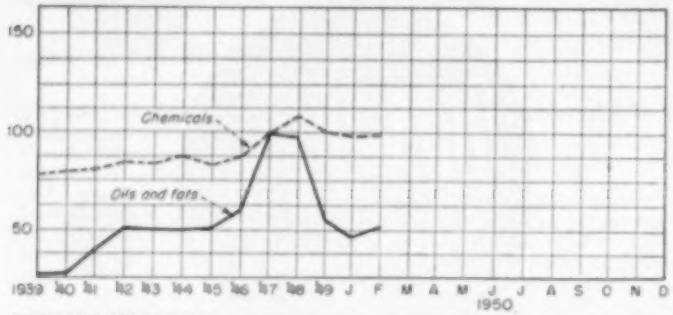
In the current situation it is interesting to see that the purchasing agents, sensitive barometers of chemical demand, seem to feel that with the coal strike settled the current coal shortage will be reduced rapidly. According to the National Association of Purchasing Agents, buying policy still ranges from hand-to-mouth to 60-day stocks. Almost 80 percent of the reporting firms fall into this category.

Price Trends

In February the price trend turned upward in both chemicals and oils and fats. Naval stores such as turpentine advanced in price. There has been a gradual tightening of many chemicals due to the coal strike but ouside of the benzene shortage there were no radical gaps between supply and demand. *Chemical Engineering*'s chemical price index rose to 99.04 by March 1. Increases pushed the *Chemical Engineering* fats and oils index up to 53.57 by March 1.

PRICE, CONSUMPTION AND PRODUCTION TRENDS

PRICES

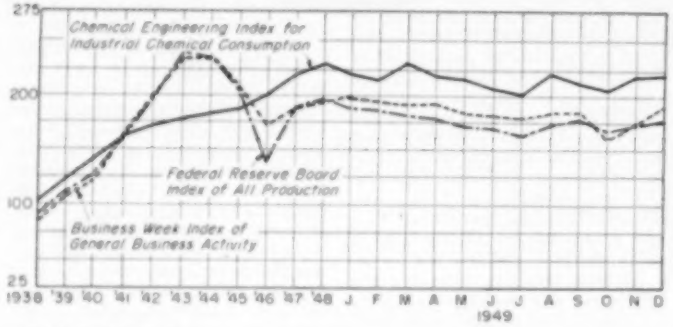


Chemical Engineering's Price Index
A month, a year, and two years ago

	Chemicals	Oils & Fats
As of March 1	99.04	53.53
Last month	98.94	51.21
March 1949	102.79	62.16
March 1948	107.28	99.94

1947 = 100

CONSUMPTION


275
200
100
25
Chemical Engineering Index for Industrial Chemical Consumption
Federal Reserve Board Index of All Production
Business Week Index of General Business Activity
1938 '39 '40 '41 '42 '43 '44 '45 '46 '47 '48 J F M A M J J A S O N D
1949

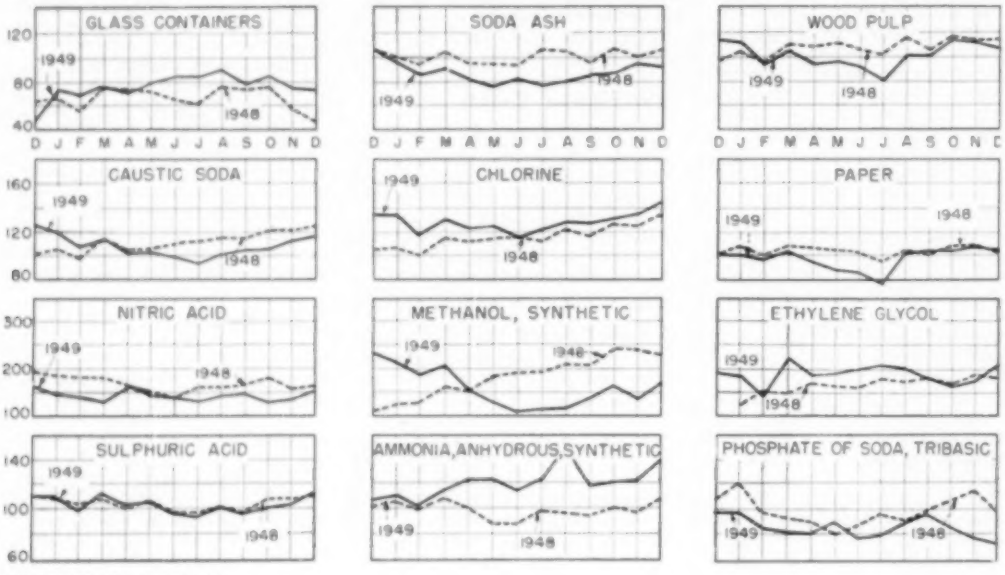
Chemical Engineering's Consumption Index for Industrial Chemicals

(A breakdown by consuming industries)

	November (Revised)	December
Fertilizers	51.20	50.49
Pulp and paper	24.23	22.62
Petroleum refining	20.75	21.90
Glass	17.85	16.80
Paint and varnish	19.50	15.96
Iron and steel	8.73	14.17
Rayon	26.61	28.25
Textiles	10.45	10.54
Coal products	10.56	10.62
Leather	3.97	3.83
Explosives	7.12	7.10
Rubber	4.83	4.87
Plastics	13.19	12.58
INDEX	220.21	219.73

1935 = 100

PRODUCTION



100=Monthly Average 1947

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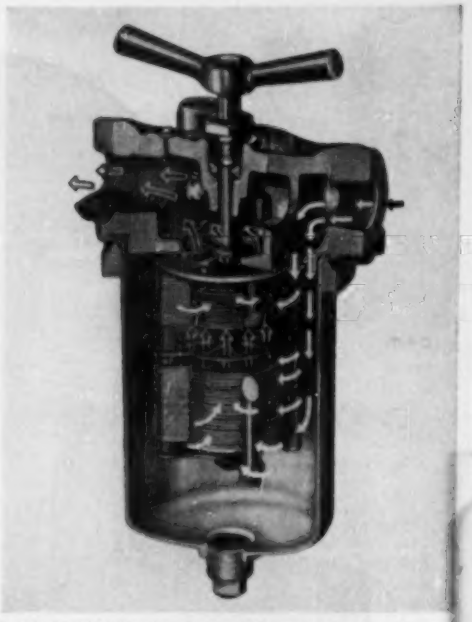
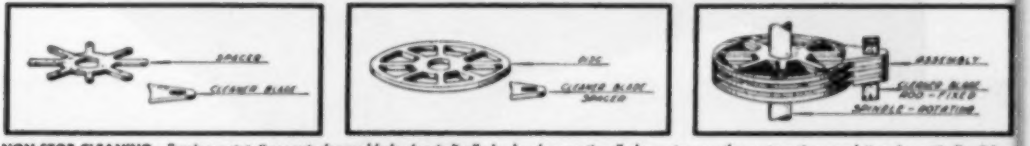
2. ***Reduce maintenance cost on strainer.***
3. ***Eliminate strainer replacement cost.***



Cuno AUTO-KLEAN Strainer. Positive fluid protection, continuously—sizes handling from a few to more than 4000 gpm.



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- ☐ Engine Fuel
- ☐ Engine Lubricating Oil
- ☐ Fuel Oil
- ☐ Fuel Tar
- ☐ Gases
- ☐ Gasoline
- ☐ Grease
- ☐ Grinder Coolant
- ☐ Hydraulic Oils
- ☐ Japan
- ☐ Lacquer
- ☐ Lubricating Oil
- ☐ Machine Tool Cutting Oil
- ☐ Machine Tool Hydraulic Oil
- ☐ Machine Tool Lubricating Oil
- ☐ Nitrocellulose Solutions
- ☐ Oils
- ☐ Paint
- ☐ Pyroxylin
- ☐ Quenching Oil
- ☐ Resins
- ☐ Rust Proofing Compounds
- ☐ Sizing
- ☐ Solvents
- ☐ Spray Systems
- ☐ Tar
- ☐ Test Stand Lubricating Oil
- ☐ Varnish
- ☐ Washing Compounds
- ☐ Water
- ☐ Wax

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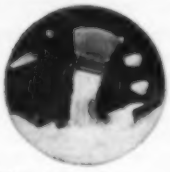
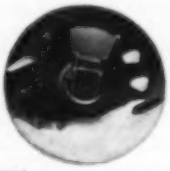


Receiving — The ingredients to be mixed enter the mixing chamber of drums through a chute. Note scoops which carry up and dump the ingredients as drum rotates assuring a more uniform mix.



Discharging — Throwing a lever closes the inlet and mixer is in discharging position. The completely mixed materials drop off the lifting scoops and discharge through chute without segregation of ingredients.

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Commodity Survey

Acrylonitrile

(*Continued from p. 114*)

ican Viscose Corp. He says that at this stage it is primarily a research and development organization utilizing the combined facilities of the two companies. Whether it becomes a manufacturing operation will depend on whether any of the synthetic fibers currently being investigated warrant commercialization.

Whichever fiber is selected, it is logical that the parent companies will contribute know-how in their respective fields of experience. The site of Chemstrand's operations will be determined by the raw material market and present plant considerations. The new company is proceeding in a careful stepwise fashion and hopes ultimately to produce one or more commercial fibers in substantial quantities.

With all these firms actively engaged in developing synthetic fibers big things are expected in the next few years. Many feel that it will find a place alongside nylon. Potential markets for polyacrylonitrile fibers are estimated to be as large or larger than nylon's. Here are some of the basic properties of orlon which Du Pont thinks will pave the way to wide acceptance: Resistance to degradation by sunlight and outdoor exposure; high flex life; high melting and sticking temperatures; high resistance to stretch; high resistance to mildew, insects, and microorganisms; high resistance to degradation by bleaching; ability to heat set; low moisture absorption; good electrical properties; rapid drying; high covering power and bulk; luxurious hand and drape; excellent dimensional stability to dry and wet cleaning; good recovery from wrinkling; and easy adaptability to standard processing equipment for textiles.

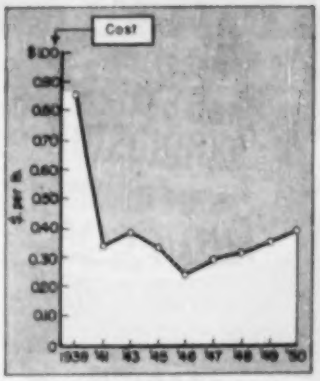
In addition to the vast potential market for acrylonitrile in fibers, which may ultimately take about 90 percent of total output, there are other uses for this versatile chemical. Of course there is synthetic rubber—Cyanamid's plant supplied 1,000,000 lb. per month to this use during the war. Other uses include pharmaceutical manufacture, insecticides, and fumigation. Dow uses a copolymer of vinylidene chloride and acrylonitrile as a coating resin. Its potential as an intermediate has not yet been tapped.

HOW IS IT MADE?

Production of acrylonitrile takes a relatively simple flowsheet and a lot of know-how. Raw materials currently used are hydrogen cyanide and ethylene oxide. Cyanamid mixes them in a continuous reactor—in the presence of a catalyst—to form ethylene cyanohydrin. The cyanohydrin is piped into a dehydrator. Here acrylonitrile and water are formed. A catalyst such as activated alumina speeds this step. The water and acrylonitrile then pass on to a decanter where acrylonitrile is drawn off to product storage. A tribute to Cyanamid's know-how is the fact that the acrylonitrile was never forced to shut down during the war. Another feather in the company's cap is the constant maintenance of its high quality standard.

Another potential method of making this chemical has been considered from time to time. Du Pont's West Coast pilot plant operations in 1942 used acetylene and HCN as raw materials. However, that plant is not producing at present. According to many experts, potentially the use of acetylene plus HCN is a low-cost operation. However, many kinks and problems lay between it and commercial operations in the United States. The advantage of the process is that the raw materials react to form acrylonitrile directly when mixed in a vertical converter in the presence of an aqueous solution of cuprous chloride. The Germans used this liquid phase catalyst operation at Leverkusen to make 70-90 tons per month. In their work acetylene and HCN were fed into the converter in the ratio of 10:1. The products were washed, steam treated and distilled. Over-all yield was about 80 percent. One problem was separations of byproducts. A more complex recovery system was necessary here compared with the method followed by Cyanamid.

A vapor phase catalysis may also be used in the acetylene-HCN method. In such cases the catalyst is generally a metallic cyanide placed on a carrier. Steam or other gases may be used under such conditions to improve the yields.



COST HISTORY shows trend switch.

The Manufacturing Chemists Association has published a safety data sheet giving details on its handling. This book points out that its hazardous properties include absorption of the vapors or liquid through the skin, lungs are attacked by its vapors. Concentration of less than 20 ppm. has to be maintained where workers are exposed for an 8-hr. day. Mixtures of 3-17 percent in air are explosive. Therefore it is handled in well ventilated areas. Acrylonitrile should be handled in closed systems whenever possible.

HOW MUCH DOES IT COST?

Biggest factor in controlling prices is cost of raw materials. For several years after the product was introduced the price fell steadily; however, after reaching a low of 24.5 c. per lb., it rose steadily along with the general price movement to its present position of 39 c. per lb. on January 1.

WHAT'S AHEAD?

The outlook for acryonitrile is good. In the early part of the year the supply was tight. With a fast growing demand larger producing capacities can be expected. With firms like Du Pont, Carbide and Chemstrand building up large investments in polyacrylonitrile type fibers, it seems logical that if it is possible patentwise, there will be more firms entering the acrylonitrile game. Cyanamid has done a fine job bringing the chemical up to its present position and pushing its expansion. But, Du Pont and Carbide have traditionally developed a basic position in their important chemical raw materials. Therefore it seems logical that eventually they may produce at least part of their requirements. However, this is something that probably will not occur until markets for the fibers have become more fully developed.

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*Article in C. & E. News Vol. 27 — #39

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Lubricating Oils	Sodium Hydroxide

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United States Production of Certain Chemicals

Chemical (Tons unless otherwise noted)	November 1949	November 1948	October 1949	October 1948
Ammonia, synthetic, anhydrous[1]	115,067	93,938	108,604	92,791
Ammonium nitrate	78,716	79,222	79,984	84,139
Ammonium sulphate, synthetic (M lb.)	157,171	46,147	142,796	38,900
Calcium arsenate (M lb.)	1,151	.....	.....	.....
Calcium carbide, commercial	55,212	55,347	47,274	57,905
Coban dioxide:				
Liquid and gas (M lb.)	19,115	15,215	19,254	17,988
Solid (M lb.)	47,144	45,519	62,956	53,149
Chlorine	155,943	147,451	151,129	147,563
Chrome green (M lb.)	1,280	980	1,451	1,041
Chrome yellow and orange, (C.P.) (M lb.)	3,712	3,604	4,404	4,040
Hydrochloric acid	44,006	38,490	43,616	39,953
Hydrogen (mill. cu. ft.)	2,972	2,507	2,908	2,563
Lead arsenate, acid and basic (M lb.)	676	.....	.....	.....
Molybdate chrome orange, (C.P.) (M lb.)	945	920	704	836
Nitric acid	91,833	91,340	88,309	90,190
Oxygen (mill. cu. ft.)	1,340	1,386	839	1,431
Phosphoric acid (80 percent H_3PO_4)	120,127	104,453	134,479	113,337
Soda ash:				
Ammonia-soda process:				
Total wet and dry[2]	260,971	206,188	238,980	205,003
Finished light[2]	191,331	211,580	163,904	198,360
Finished dense	119,305	135,253	114,280	146,431
Natural[3]	17,413	19,196	20,736	25,226
Sodium bicarbonate, refined	13,604	11,973	15,373	14,407
Sodium bichromate and chromate	5,781	5,277	5,988	5,490
Sodium hydroxide:				
Electrolytic process:				
Liquid[4]	145,807	140,778	144,243	141,280
Solid	19,022	20,172	19,253	20,219
Lime-soda process				
Liquid[4]	50,670	66,716	45,134	67,456
Solid	10,720	23,210	15,040	23,532
Sodium phosphate:				
Monobasic	1,247	1,187	1,330	1,351
Dibasic	13,798	9,780	13,306	9,380
Tribasic	5,798	7,385	6,150	6,836
Meta	3,647	3,557	2,603	3,452
Tetra	7,158	5,935	9,117	4,965
Sodium silicate, anhydrous	46,073	46,908	49,912	38,232
Sodium sulphate:				
Anhydrous	13,181	14,038	12,190	15,936
Glauber's salt[5]	15,990	15,427	14,962	16,127
Salt cake[6]	42,022	50,294	41,184	60,674
Sulphuric acid[6, 7]				
Chamber process	221,261	240,317	213,426	230,174
Contact process, new	644,305	626,530	612,851	644,047

Data for this tabulation have been taken from "Facts for Industry" series issued by Bureau of the Census. Production figures represent primary production and do not include purchased or transferred materials. Quantities produced by government-owned arsenals, ordnance works, and certain plants operated for the government by private industry are not included. Chemicals manufactured by TVA, however, are included. All tons are 2,000 lb. Where no figures are given data are either confidential or not yet available. [1]Includes a small amount of aqua ammonia. [2]Total wet and dry production, including quantities diverted for manufacture of caustic soda and sodium bicarbonate, and quantities processed to finished light and finished dense. [3]Not including quantities converted to finished dense. [4]Data collected in cooperation with the Bureau of Mines. [5]Figures represent total production of liquid materials, including quantities evaporated to solid caustic and reported as such. [6]Includes oleum grades, excludes spent acid. [7]Data for sulphuric acid manufactured as a byproduct of smelting operations are included.

United States Production of Synthetic Organic Chemicals

	November 1949	November 1948	October 1949	October 1948
Acetanilid	285,988	.....	273,995	.....
Acetic acid:				
Synthetic	38,623,056	38,992,372	38,057,189	35,957,360
Recovered	149,152,399	156,250,882	151,521,363	160,787,009
Natural[1]	1,299,634	2,246,074	1,599,452	2,264,170
Acetic anhydride[2]	70,852,594	73,450,150	68,706,244	69,388,136
Acetone	37,563,360	44,430,492	35,874,280	39,434,752
Acetylsalicylic acid	942,708	1,067,934	926,661	1,076,570
Aniline	7,393,657	6,212,145	6,840,300	7,242,613
Barbituric acid derivatives:				
5-Ethyl-5-phenylbarbituric acid and salts (phenobarbital)	29,153	33,506	.....	35,280

(Continued on page 296)

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Controls to Lengthen Life

of Condenser and Heat Exchanger Tubes

Although the selection of the correct alloy for tubes in heat exchangers is of vital importance, especially under circumstances which produce highly corrosive conditions, the protection of these tubes from foreign matter and during storage is also essential.

The information listed below, although previously published in separate articles in the Copper Alloy Bulletin, may provide a speedy check list for the engineer looking for ways of increasing tube life.

Suggested Record Form

Accurate records provide valuable information when the time comes for retubing of equipment. They are also of great value in analyzing reasons for premature failure.

1. Length of time tubes have been in service.
2. History of tube performance in this condenser and adjacent ones.
3. Type of condenser.
4. Temperatures, velocities, and pressure.
5. Elevation of condenser in relation to intake.
6. Operating schedule.
7. Frequency of cleaning and type of debris found.
8. Evidence and nature of pollution.
9. Location of condenser and nature of cooling water.
10. Composition of cooling water.

Controlling Foreign Matter

Since foreign matter is partly responsible for damage and corrosion, it is obvious that its entrance into the heat exchanger should be prevented in so far as possible by:

1. Long intake tunnels or channels which allow much foreign matter to settle out before it reaches the condensers.
2. Baffles in intake tunnels which are an effective means of keeping floating debris from entering the plant.
3. Stationary and rotating screens, which are desirable for keeping out such foreign matter as stones, shells, cinders, etc.
4. Dredge channel and keep intake tunnel clean.
5. Use screens fine enough to prevent debris from entering the condenser tubes.
6. Clean out water box, keep paint intact.
7. Clean out tubes regularly with high pressure air or water applied at the exit end. The pushing of rubber plugs through the tubes is also effective. Do not use wire brushes.
8. Flush tubes with clean water when possible.
9. If troubled with marine growth, investigate possibilities of using chlorination.

Cleaning Methods

Cleaning methods for heat exchange tubes vary from plant to plant and generally fall into the categories listed below:

A. Manual or mechanical methods for removal of silt, slime, debris and large fouling organisms.
   1. Hand removal of debris and "rodding".
   2. "Shooting" rubber plugs, brushes and scrapers.
   3. Jetting with water or water-air or water sand.
   4. Drying with hot air.

B. Control of fouling or deposits
   1. Screening
   2. Chlorination
   3. Increasing water velocity
   4. Heating the water
   5. Changing salinity of the water
   6. Lowering water oxygen content
   7. Poisoning with various poisons

C. Methods of scale removal
   1. Inhibited acids
   2. Bases
   3. Flexing of tubes
   4. Thermal shocking

Storing Tubes

Damage to tubes in storage is not uncommon. The following suggestions may help:

1. Keep tubes in cases, flat until ready for use—don't stack high enough to crush bottom cases.
2. Select a dry, protected storage location not subject to extremes of humidity and temperature.
3. Avoid outdoor storage especially where there is dirt, smoke, soot, and corrosive fumes.
4. If cases become watersoaked, both the cases and tubes should be promptly dried out.
5. When ready to use, remove tubes from cases carefully.
6. If stored in racks, tubes should be properly supported.

Checking Vibration

Excessive vibration of tubes can lead to corrosion fatigue cracking. In old heat exchangers vibration has been reduced by:

1. Using more tube support sheets.
2. Wedging pieces of wood or flattened tubing between the rows of tubes affected.
3. Making sure that all equipment is running smoothly and by avoiding critical operating speeds of turbines, pumps, etc.

Selection of Alloys

Bridgeport's corrosion laboratory can be very helpful in the selection of the alloy which will stand up best under present operating conditions. The importance of trying out samples of various condenser tube alloys under actual operating conditions cannot be overemphasized. Today's more severe operating conditions often call for better, more corrosion resisting alloys. For example, Admiralty must often be replaced by Aluminum Brass or Aluminum Bronze or Cupro Nickel in order to obtain satisfactory service life on the eastern seaboard. Call our nearest branch office for help.

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U. S. Production of Synthetic Organic Chemicals, cont. from page 294

	November 1949	November 1948	October 1949	October 1948
Benzene:				
Motor grade:				
Tar distillers[2]	294,366	.....	86,864	.....
Coke oven operators[2]	388,016	653,714	434,786	694,277
All other grades:				
Tar distillers[2]	1,080,273	900,464	705,603	1,000,867
Coke oven operators[2]	6,734,319	13,425,626	2,430,349	15,399,171
Butyl alcohol, primary, normal	12,076,691	13,099,948	10,489,812	14,482,925
Carbon bisulphide	34,547,142	35,983,921	32,616,126	35,926,315
Carbon tetrachloride	17,154,033	18,394,750	14,548,298	19,298,357
Chlorobenzene, mono	24,197,025	25,339,446	24,099,227	27,134,884
Creosote oil:				
Tar distillers[2]	5,202,930	11,004,341	5,209,603	9,104,179
Coke oven operators[2]	993,030	2,431,780	367,112	2,862,096
Cresols, meta-para	868,433	793,264	960,057	791,504
Cresols, ortho-meta-para	603,230	731,781	...	1,011,130
Cresylic acid, refined[3, 10]	1,882,676	2,989,511	1,903,385	1,509,421
Dibutyl phthalate	1,132,767	1,344,567	1,344,222	1,546,424
Dichlorodiphenyltrichloroethane (DDT)	1,818,930	2,679,474	3,063,520	1,102,571
Ethyl acetate (85 percent)	6,661,696	6,904,015	6,681,776	5,007,991
Ethylene glycol	33,389,128	31,872,093	31,891,361	33,027,749
Ethyl ether	2,932,960	3,176,906	3,223,246	3,246,099
Formaldehyde, 37 percent by wt.	91,886,327	80,089,935	99,253,027	87,223,108
Hexachlorocyclohexane	1,890,102	1,137,206	2,573,732	1,447,378
Methanol, natural[3]	1,097,679	1,271,890	1,096,332	1,232,696
Methanol, synthetic	94,998,646	99,472,057	73,998,881	109,873,706
Naphthalene:				
Tar distillers, less than 79°C.	16,363,098	16,528,656	16,677,337	20,546,930
Tar distillers, 79°C and over	6,794,154	6,571,444	5,773,878	7,625,897
Coke-oven operators, less than 79°C.	3,486,439	9,308,245	944,330	9,263,028
Penicillin and salts	11,030,961	8,141,914	11,647,698	8,620,558
Phenol	20,307,173	25,062,725	18,827,563	27,535,860
Phthalic anhydride	16,339,944	15,920,745	16,284,350	13,977,414
Styrene, government and private plant	33,966,532	32,990,089	35,272,550	32,075,908
Toluene:				
Coke-oven operators	1,454,845	2,473,516	742,903	2,425,820
All others[3]	3,102,681	3,579,581	2,314,620	3,618,380
Xylene, crude	4,233,300	4,618,445	3,826,018	5,420,416

All data in pounds except benzene (gal.) creosote oil (gal.), toluene (gal.) xylene (gal.) and penicillin (million Oxford units). Statistics collected and compiled by U. S. Tariff Commission except where noted. Absence of data on production indicates either that returns were unavailable or confidential. [1]Excludes the statistics on recovered acid. [2]Acid produced by direct process from wood and from calcium acetate. [3]All acetic anhydride including that from acetic by vapor-phase process. [4]Product of distillers who use purchased coal tar only or from oil-gas or water-gas produced or purchased by tar distillers. [5]Statistics are given in terms of bulk medicinals only. [6]Statistics collected by Bureau of Mines. [7]Total production including data reported both by coke-oven operators and by distillers of purchased coal tar. [8]Reported to U. S. Bureau of the Census. [9]Includes toluene produced from petroleum by any process. [10]Includes refined cresylic acid from petroleum.

WHAT'S TO BE SAID ABOUT

SATISFIED USERS

The building of dependable water producing equipment involves a lot of extraordinary skill. And when it comes to skill Layne leans mighty heavily on seventy years of world-wide experience. It is from such experience that Layne has been able to find and strengthen weak points, use tougher and longer lasting materials and to constantly increase over-all efficiency. As a result, users almost invariably stick to Layne equipment on each of their additional units.

It is a widely known fact that Layne Well Water Systems, point for point, always measure "head and shoulders" above any other make. This means that there is no advantage whatever in buying the so called "just as good" equipment. Furthermore there is no use telling you that this or that Layne part is super-duper. What you are buying—and have every right to expect, is unquestionably good performance over a long period of years. That, in brief, is exactly what Layne offers without reservation of any nature.

For further information, catalogs, bulletins, etc., address

LAYNE & BOWLER, INC.
GENERAL OFFICES, MEMPHIS 8, TENN.

LAYNE

BUILDERS OF HIGH EFFICIENCY

WELL WATER SYSTEMS

ASSOCIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. • Layne-Atlantic Co., Norfolk, Va. • Layne-Central Co., Memphis, Tenn. • Layne-Northern Co., Mishawaka, Ind. • Layne-Louisiana Co., Lake Charles, La. • Louisiana Well Co., Monroe, La. • Layne-New York Co., New York City. • Layne Northwest Co., Milwaukee, Wisc. • Layne-Ohio Co., Columbus, Ohio • Layne-Pacific, Inc., Seattle, Wash. • The Layne-Texas Co., Ltd., Houston, Texas • Layne-Western Co., Kansas City, Mo. • Layne-Minnesota Co., Minneapolis, Minn. • International Water Corporation, Pittsburgh, Pa. • International Water Supply Ltd., London, Ont., Can. • Layne-Hispano Americana, S. A., Mexico, D. F. General Pitter Company, Ames, Iowa

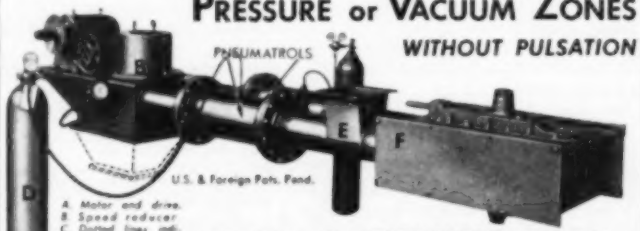
HAPMAN PNEUMATROLS

Now CONVEY CONTINUOUSLY

INTO OR OUT OF

PRESSURE or VACUUM ZONES

WITHOUT PULSATION



A. Motor and drive. B. Speed reducer. C. Dotted lines indicate position of pressurized hopper in actual installation. D. Tanks supplied air source for actuating Pneumatrols in test setup. E. Receiving hopper. F. Standard take-up for Hapman chain conveyor.

The restricted nature of most new processes prevents securing plant photographs of the Pneumatrol installations now operating successfully. Names will be furnished on request.

HANDLE ANY FLOWABLE MATERIAL

This photo shows the testing set-up prior to shipping an installation of a Hapman circular flight chain conveyor equipped with Hapman Pneumatrols. The pressure-sealed Pneumatrols used with the Hapman pressure-tight, chain-link and flight assemblies, make it possible to convey any flowable material into or out of vacuum and pressure zones intermittently, continuously or it can be processed in motion through these zones. Complete information on request.

HAPMAN CONVEYORS, Inc. 2405-C W. McNichols Road Detroit 21, Michigan

How to choose Chemical Resisting Coatings

for INCREASED PROTECTION against Corrosion

This booklet can help you pick the UCILON† COATING SYSTEM that provides long-lasting protection against many corrosives causing coating problems!

Here's an easy, systematic method for selecting the right maintenance coatings for your job. Based on proved Ucilon Coating Systems, the following method will enable you to choose on the basis of service conditions — tell you at a glance which coatings can stand up on the job:

1. Consult this 32-page booklet. It lists 153 corrosive agents — including acids, alkalies, water, oils, salts, organic materials. Chances are the cause of your own problem is listed.

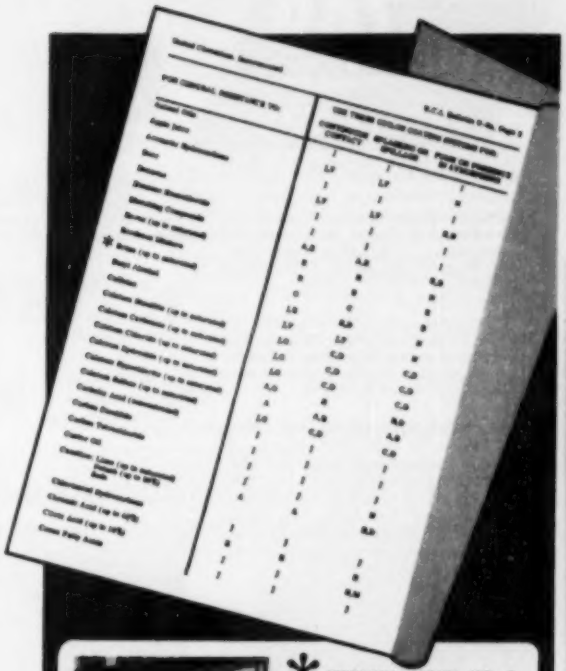
2. Read across and, depending on whether you want resistance to constant immersion and contact, or to splashing, or merely to vapors, pick out one of the recommended systems. By so doing, you automatically select the various Ucilon coatings which comprise that system.

3. Then look up the system denoted by the letters and apply the individual coatings according to clear, step-by-step instructions which follow.

A simple procedure — yet it has proved to be outstandingly successful. Users of these coating-systems have been reporting that they get not only better protection for plant and equipment but savings in painting costs as well!

Send for *your* copy of this booklet — first step in eliminating extra expense and maintenance headaches. And then see for yourself why Ucilon Coating Systems have proved to be the answer so often where other coatings failed.

† Trade Mark



*** TYPICAL CASE IN A LARGE CHEMICAL PLANT:**

A Ucilon Coating System was applied to the interiors of steel tanks where the coatings were subjected to continuous contact with brine. At last inspection, maintenance men reported that the Ucilon coatings were still giving complete protection after more than *5 years* on the job!

UCILON Protective Coatings

UNICHROME **Products of UNITED CHROMIUM, INCORPORATED**

51 East 42nd St., New York 17, N. Y. • Waterbury 90, Conn. • Detroit 20, Mich. • Chicago 4, Ill. • Los Angeles 13, Cal. • In Canada: Toronto, Ont

UNITED CHROMIUM, INCORPORATED, 51 East 42nd Street, N. Y. 17, N. Y.
Please send me your 32-page booklet on Ucilon Protective Coating Systems.

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

NEW CONSTRUCTION

	Current Projects		Cumulative 1950	
	Proposed Work	Contracts	Proposed Work	Contracts
New England	.....	.....	$2,000,000	.....
Middle Atlantic	.....	$1,000,000	.....	$2,570,000
South	$1,500,000	1,055,000	3,268,000	1,395,000
Middle West	75,000	265,000	2,445,000	8,495,000
West of Mississippi	25,575,000	12,800,000	56,375,000	16,852,000
Far West	68,000	130,000	18,236,000	2,702,000
Canada	320,000	10,157,000	12,620,000	11,347,000
Total	$27,538,000	$25,407,000	$91,944,000	$43,361,000

Proposed Work

Ga., Savannah—Union Bag & Paper Corp., Lathrop Ave., plans to construct an addition to its plant. Estimated cost $1,500,000.

Ind., Decatur—Central Soya Co., Decatur, plans to remodel its 2 story boiler house and storage buildings. Sargent & Lundy, 140 South Dearborn St., Chicago, Ill., Engrs. Estimated cost $75,000.

Neb., Olaha—Paramount Paper Products Co., 1408 Howard St., Omaha, plans to construct a new plant. J. E. Loftus, Omaha Natl. Bank Bldg., Omaha, Archt. Estimated cost $100,000.

N. M., Carlsbad—Potash Co. of America, c/o Parker S. Dunn, Res. Mgr. Carlsbad, plans to construct a chemical plant for the production of potassium sulphate and hydrochloric acid. Estimated cost $1,000,000.

N. M., Farmington—Delhi Oil Corporation, 1315 Pacific St., Dallas, Tex., plans to construct a gasoline refinery in this area. Estimated cost $1,750,000.

Okla., Oklahoma City—Monarch Refineries, Inc., 2800 N. E. 4th St., plans to construct a vacuum tube unit. Estimated cost $2,500,000.

Ore., Portland—California Container Corp., 934 N. E. 25th St., plans to construct a 1 story plant to contain 80,000 to 100,000 sq. ft. floor space, for the manufacture of folding cartons and corrugated shipping containers.

Tex., Coleman—Anrac Oil Corp., Coleman, plans to construct a gas injection refinery unit to have a daily capacity of 500,000 cu. ft. Estimated cost $750,000.

Tex., Corpus Christi—Pontiac Refining Corp., 3400 Lawrence Dr., and Chicago Corp., 3105 Leopard St., plan to construct a chemical plant and refinery for the manufacture of Ethylene glycol, Ethylene oxide and higrade gasoline. Estimated cost $15,000,000.

Tex., Eastland—Lone Star Gas Co., 1915 Wood St., Dallas, plans to increase the daily capacity of its plant 15,000 gal. Estimated cost $550,000.

Tex., Etter—Phillips Chemical Co., Etter, plans to enlarge the capacity of its chemical plant. Estimated cost $3,000,000.

Tex., Lubbock—Plains Cooperative Oil Mill, Lubbock, plans to enlarge its oil mill. Estimated cost $75,000.

Tex., Pasadena—Chipman Chemical Co., Pasadena, plans to construct a new plant. Estimated cost $100,000.

Tex., Wichita Falls—Bolin Trust, Wichita Falls, plans to construct a new gas injection unit. Estimated cost $750,000.

N. S., Middleton—Annapolis Valley Peat Moss Co., Ltd., c/o H. M. Wright, plans to construct a plant for processing peat moss. Estimated cost $70,000.

Que., Hull—Canada Cement Co., Ltd., 606 Cathcart St., Montreal, plans to construct an addition to its plant. Estimated cost will exceed $150,000.

Que., St. Laurent—Canadian Industrial Glass, Ltd., 8 Napoleon St., plans to construct an addition to its plant. Estimated cost $100,000.

Contracts Awarded

Calif., Vernon—Gates Rubber Co., 2240 East Washington Blvd., Los Angeles, has awarded the contract for a warehouse in the Central Mfg. Dist., to Wm. P. Neill Co., Ltd., 4814 Loma Vista St., Los Angeles. Estimated cost $130,000.

Fla., Jacksonville—The Austill Waxed Paper Co., c/o George W. Simons, Engr., Hilderbrandt Bldg., has awarded the contract for the new plant for the production of waxed paper to Ivy H. Smith Co., 1525 San Marco Blvd., Jacksonville. Estimated cost $75,000.

Ill., Chicago—Service Plastics Co., 1120 West Jackson Blvd., has awarded the contract for a factory to Jacob Cohen, 52 West Waller St. Estimated cost $68,000.

N. J., Merchantville—Kieckhefer Container Corp., 130 North Bway., Camden, has awarded the contract for a 1 story manufacturing plant to Charles F. Rohleder, 600 Schuylkill Ave., Philadelphia, Pa. Estimated cost $1,000,000.

N. C., Charlotte—American Analine Products, Inc., 301 East 7th St., has awarded the contract for a plant building to Southeastern Construction Co., 205 East Bland St. Estimated cost $80,000.

Okla., Okmulgee—Phillips Petroleum Co., Bartlesville, will construct an oil separating and processing plant. Work will be done by owner. Estimated cost $3,750,000.

Tex., Chico—Cities Service Oil Co., Chico, will enlarge and improve its natural gas processing plant. Work will be done with own forces. Estimated cost $450,000.

Tex., Corpus Christi—Erle P. Halliburton & Assoc., Driscoll Hotel, will construct a cement manufacturing plant. Work will be done by owner. Estimated cost $1,750,000.

Tex., Freeport—Dow Chemical Co., Freeport, has awarded the contract for the construction of an ammonia plant to Austin Co., M & M Bldg., Houston. Estimated cost $4,500,000.

Tex., Mineral Wells—Lone Star Gas Co., 1915 Wood St., Dallas, has awarded the contract for a hyperabsorption plant to Foster-Wheeler Corp., Shell Bldg., Houston. Estimated cost $850,000.

Tex., Port Neches—B. F. Goodrich Chemical Co., Port Neches, has not awarded contract for enlarging its plant here for the manufacture of cold rubber synthetics as stated in the February issue. No expansion work is under way or proposed at this city.

Tex., Snyder—Fullerton Oil Co., Snyder, plans to construct a refrigerator type gasoline plant to have a daily capacity of 40 mi. cu. ft. to Hudson Engineering Corp., 2711 Danville St., Houston. Estimated cost $1,500,000.

Va., Winchester—Shenandoah Silica Co., c/o C. B. Michael, contractor, Berkeley, will rebuild its warehouse. Estimated cost $100,000.

W. Va., Fairmont—Owens-Illinois Glass Co., Fairmont, has awarded the contract for a 1 story warehouse to Neighlongell Construction Co., Huntington. Estimated cost $700,000.

W. Va., Weirton—Weirton Steel Co., Weirton, has awarded the contract for a battery of 61 coke ovens, also alterations and extensions to its byproducts and benzol plants here, to Koppers Co., Inc., Pittsburgh, Pa.

Wis., Milwaukee—The Texas Co., Minneapolis, Minn., has awarded the contract for warehouses and office building to Meredith Bros., Inc., 121 East Washington St., Milwaukee, at $196,500.

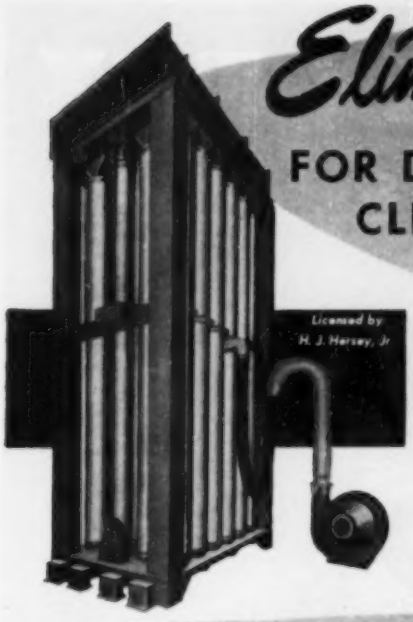
B. C., Vancouver—Liquid Carbonic Canadian Corp., Ltd., 2107 West 11th Ave., has awarded the contract for a 1 story dry ice and carbonic acid factory and office building to Smith Bros. & Wilson, Ltd., 1267 Richards St., at $157,971.

Man., Winnipeg—Imperial Oil, Ltd., 56 Church St., Toronto, Ont., has awarded the contract for an oil refinery at East Paul to Canadian Kellogg, Ltd., 34 Adelaide St., W., Toronto. Total estimated cost $10,000,000.

Eliminate Shutdowns

FOR DUST FILTER CLEANING!

DAY "Autoclean" DUST FILTER

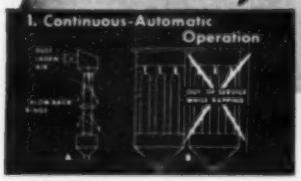


The **DAY** "Autoclean" Dust Filter was designed primarily for chemical and other industries requiring continuous-automatic filtering with constant air volumes. Because of its automatic cleaning mechanism, the **DAY** "Autoclean" never has to be shut down for cleaning or rapping. This maintains uniform back pressure assuring a constant air volume through the entire filter at all times. The result is a continuous, effective and efficient job on even the finest dust particles.

Actual installations are operating successfully with air to cloth ratios of 10, 15 or 20 to 1. In many industries the highly effective performance of the **DAY** "Autoclean" results in the saving of valuable product.

Write For FREE Dust Filter Bulletin Number 491

Advantages OF THE DAY "Autoclean" DUST FILTER



A. Reverse air jet cleaning rings travel up and down the tubes of the **DAY** Filter constantly cleaning the cloth. This permits continuous filter operation with a maximum cloth area loss of only 1¼%.

B. Most other types of filters must shut off a complete section for cleaning or rapping. This may amount to 50% of the cloth area.

A. Back pressure rises slightly when the **DAY** Filter is first started, then levels off and remains uniform. This assures the constant air volume necessary for maximum dust collection efficiency.

B. Sharp back pressure and air volume variations occur in rapping type filters when sections must be shut down for cleaning.

A. The **DAY** reverse air jet cleaning mechanism is gentle yet positive, cleaning each tube uniformly and permitting the use of high efficiency felt filtering cloth.

B. Tougher cloth with resultant poorer filtering quality must be used in rapping type filters. Cleaning effectiveness varies widely from point of vibration to where cloth is attached to filter.

4. Parallel Air Flow— Dust laden air enters the top plenum of the **DAY** "Autoclean" Dust Filter. Dust and air then travel together down the tubes. This parallel flow helps blow the dust into the bottom hopper. In opposed flow filters where the dust laden air enters at the bottom, the upward pressure of the air escaping through the cloth tends to hold the dust within the tube until the air is shut off.

5. Separated Dust Streams . . . One **DAY** "Autoclean" Dust Filter can handle several different product streams simultaneously *without mixing*. This is done by installing splitters in the receiving plenum and connecting tube rows to separate fan units as required. Individual screw lock feeders under each row of tubes discharge products separately. Thus one **DAY** Filter does the work of several individual units.

6. Economy From The Start— You save money on original cost with a **DAY** Filter because you buy less filter to handle equal volumes of air. Continuous-automatic operation, minimum cloth area loss for cleaning and better filtering fabric permit use of less cloth and a smaller unit to handle your filtering requirements. In addition, less floor space is needed and installation and maintenance costs are minimized.

DAY SINCE 1881

The DAY Company

856 3rd Ave. N. E., Minneapolis 13, Minn.
IN CANADA: P. O. Box 70N · Ft. William, Ontario
Branch Plants in Ft. Worth, Buffalo and Welland, Ontario

this is CMH REX-FLEX

flexible stainless steel hose

While the need rarely arises, tying CMH REX-FLEX into a knot does illustrate the high degree of flexibility of this *all-metal* corrugated stainless steel hose. And the same characteristics of stainless steel that make REX-FLEX so flexible also give it the ability to withstand extreme cycles of vibration, flexation and variplane motions.

Light in weight... high in strength... leak-proof . . . and highly resistant to corrosion, REX-FLEX is the answer to the problems of handling searching and corrosive liquids and gases where there is motion.

CMH REX-FLEX is made in sizes from 5/16" through 6" I.D. Wall thicknesses from .003" in single ply to .030" in multiple plies. Available with helical or annular corrugations, with or without metal braid covering. Ends may be flanged or equipped with fittings to meet your requirements. Write for complete information.

CMH—ONE dependable source
for every flexible metal hose requirement

• CMH manufactures all standard types of flexible metal hose, both convoluted and corrugated, in a variety of metals; expansion joints for piping systems; stainless steel and brass bellows; various conduits and special assemblies of these components.

CHICAGO METAL HOSE CORPORATION

CMH

FLEXON . . . . . identifies CMH products which have served industry for more than 47 years.

Leaders in the Science of Flexonics
1317 S. Third Avenue
MAYWOOD, ILLINOIS
Plants at Maywood, Elgin and Rock Falls, Illinois
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ontario

How Darling features prevent trouble and expense

GREATER SERVICE LIFE

EXPERIENCED valve users know that the value of a valve is not determined by its price tag but by its service life, reliability, and the amount of maintenance and down-time necessary to keep it in operation. To assure greater service, the following advantages are combined in Darling's unique Fully Revolving Double Disc Parallel Seat Gate Valves:

1. **Discs do not wear unevenly.** Free to revolve completely, the discs seat in a different position at each closing, thereby multiplying the effective life of both discs and body seats.
2. **Face-to-face contact seating.** In closing, the discs are directly opposite the seat faces before wedging action takes place. In opening, wedging pressure is fully released before *either* gate starts to rise.
3. **Automatic adjustment for body distortion.** Diagonal face of upper wedge is curved and lower wedge face is straight; both faces are transversely beveled, to equalize wedging pressure against discs and permit tight 360° seating despite any misalignment of seats.
4. **Destructive strong-arm methods unnecessary.** Above features entirely eliminate need to "jam" valves shut or "break" them open.
5. **Advanced metallurgy.** Unusually rigid control and advanced methods provide castings that are superior to ordinary castings in strength, density, pressure-resisting characteristics, and in resistance to abrasion and corrosion.

To obtain greater valve life and trouble-free performance, be sure to specify Darling Fully Revolving Double Disc Parallel Seat Gate Valves.

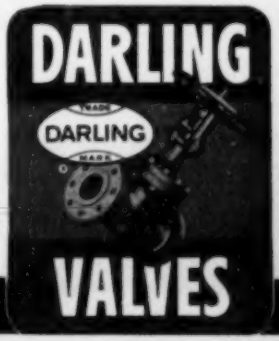
DARLING VALVE & MANUFACTURING CO.
WILLIAMSPORT 3, PA.

"This advertisement is one of a series showing how the unique Darling Fully Revolving Double Disc Parallel Seat Gate Valves answer the following critical operating problems:
- Positive, easy closing—regardless.
- Automatic adjustment for valve body distortion.
- Elimination of disc-to-seat friction and galling.
- Uniform wear distribution.
- Extreme simplicity.
- Greater service life.
- Simplified maintenance.

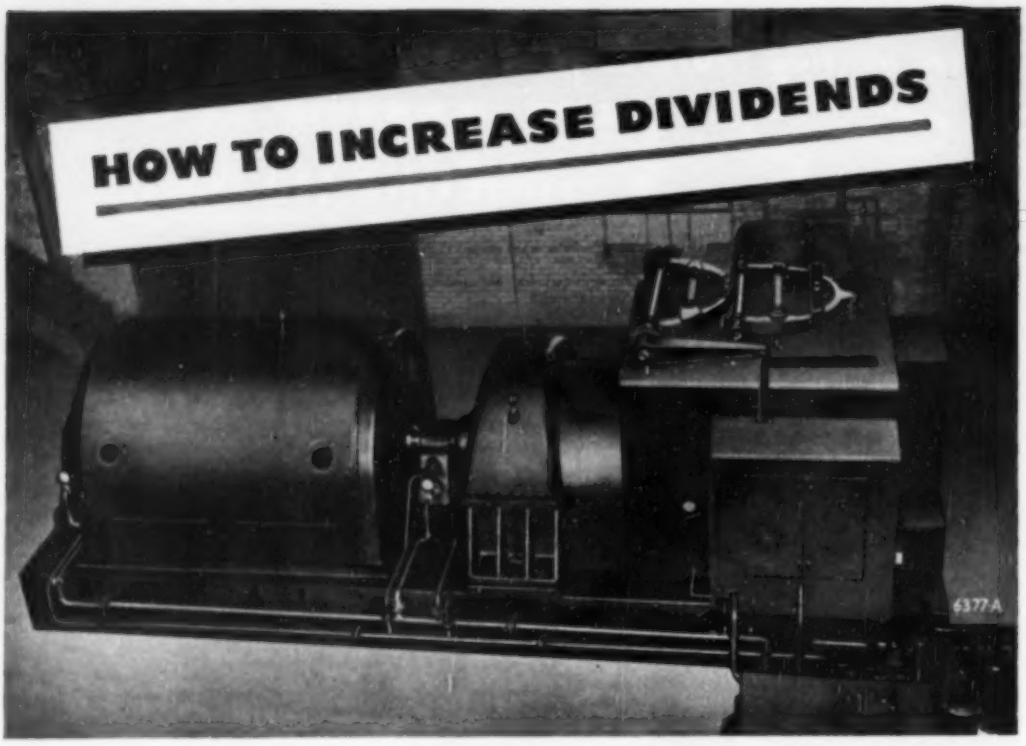
CORROSION RESISTANT VALVES

In addition to conventional iron, bronze and steel constructions, Darling specializes in valves for any corrosive fluid: iron body valves with special alloy trim; iron body, rubber lined, with special alloy trim; all bronze; and all special alloy. Darling's 50 years of experience in meeting unusual requirements is always at your service.

Outline your service requirements and get complete information on Darling Valves of the proper type. Or, send for the complete 300-page Darling Catalog No. 17M. It describes Darling Valves of all types for every normal or unusual service, and for pressures up to 1500 pounds. It's full of helpful information... Yours for the asking.



THE VALVE MARK OF QUALITY . . . WATCH FOR IT



Ask your consulting engineer about the economy of producing power as a by-product!

When steam is required for heating or processing, the cost of producing *power* as a by-product is so low that it is not unusual for the installation of a modern De Laval Turbine Generator to realize savings of as much as one-tenth or one-quarter of a company's total paid out dividends.

Why not sit down with your consulting engineer and make a careful study of your present power plant. It may pay dividends for your company too!

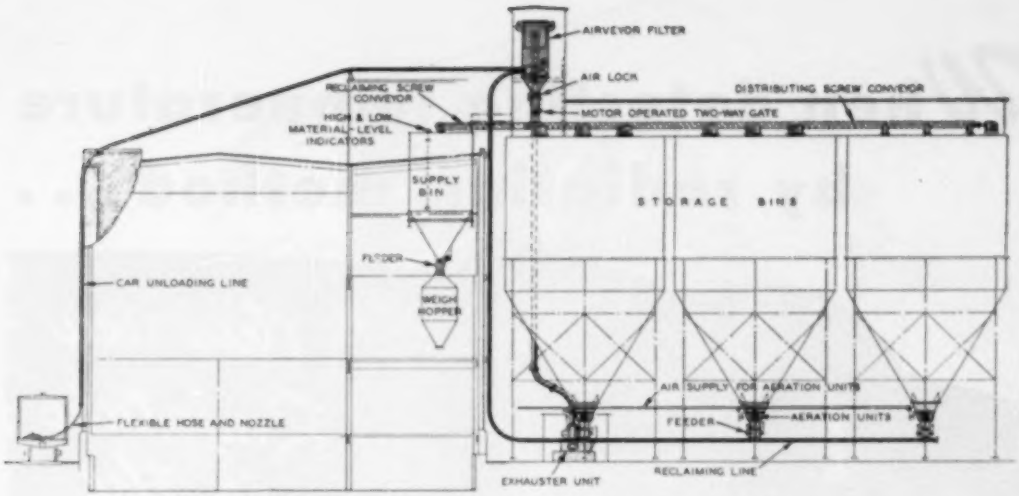
For preliminary information send for **Catalog** 4205-28-M

DE LAVAL STEAM TURBINE CO., TRENTON 2, N. J.

TURBINES • HELICAL GEARS • CENTRIFUGAL BLOWERS AND COMPRESSORS
CENTRIFUGAL PUMPS • WORM GEAR SPEED REDUCERS • IMO OIL PUMPS

DE LAVAL

T-28



Conveying clay . . . the better way

The AIRVEYOR®

Many paper mills in the United States and Canada find it good business to use the Airveyor to unload and convey clays.

The above drawing illustrates an Airveyor installed in a paper mill in Pennsylvania. Pulverized coating clay, with a moisture content of not over three percent, is unloaded from box cars (also from hopper-bottom cars if desired) and conveyed to the Airveyor filter, for delivery to any one of three storage bins, or direct to a supply bin above a weigh hopper. Unloading rate, 10 tons an hour. The same system is also used to reclaim the clay from the storage bins and deliver to the supply bin, through remote control from a centrally located panel board. Provision is also made to return, automatically, the clay to the storage bin, from which it is being conveyed, when the supply bin is full; or to any bin when clay is being unloaded from cars.

When you have a conveying problem, why not call in a Fuller engineer. We'll be glad to make a survey, and suggest equipment for the betterment of your conditions. No obligation on your part.

FULLER COMPANY
CATASAUQUA—PENNSYLVANIA
Chicago 3 - 120 So. LaSalle St.
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FULLER

FULLER-KINYON SYSTEMS · FULLER-FLUXO ROTARY FEEDERS AND VALVES · AIRVEYOR ROTARY COMPRESSORS AND VACUUM PUMPS · F-H AIRSLIDE CONVEYING INCLINED GRATE COOLER · DRY PULVERIZER MATERIAL COOLER · MATERIAL-LEVEL INDICATOR · AERATION UNITS · AIRLIFT · CONSTANT HEAD FEEDER · SLURRY VALVES MOTION SAFETY SWITCH · SAMPLERS

A-101

When detecting temperature by radiation method . . .

● ***Quick-sighting optical system*** **lets user select desired target easily, and then check the sharply-defined area which the Rayotube sees. Increased sharpness is also of benefit when radiation comes from end of a closed tube.**

● ***Hermetically sealed construction*** **at lens, window, and leadwires keeps out dust and gases. New design guards inherent accuracy and stability, even with high or rapidly changing Rayotube housing temperatures.**

Which do you want?

If you already know about Rayotubes, we'll send you brief material to bring you up-to-date on the new model. If you want the full story on all Rayotubes, ask for Cat. N-33B. Please specify. Write Leeds & Northrup Company, 4916 Stenton Ave., Phila. 44, Pa.

Built to work with all Micromax and Speedomax Rayotube instruments, this new Rayotube is an important advance in radiation pyrometry. Present users of Rayotubes, as well as future ones, will find this completely new, advanced design detector unusually easy to apply, especially to such equipment as slab furnaces, soaking pits, open-hearths, ceramic kilns . . . wherever operating conditions are severe.

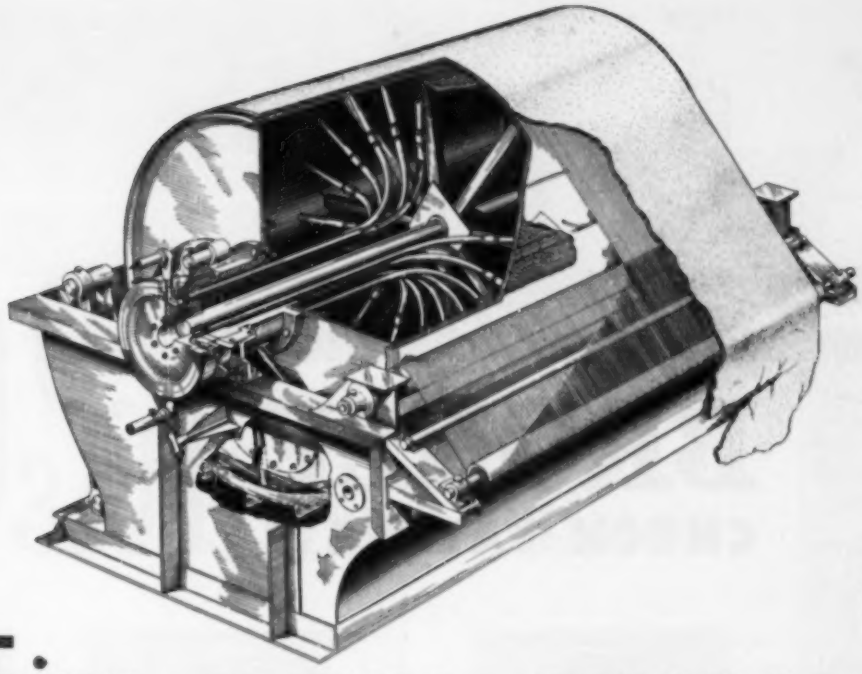
Purposely designed for easy, low cost replacement, the new Rayotube fits all existing Rayotube mountings. This unit requires no protection against high ambient temperature unless its housing temperature exceeds the very high figure of 350 F. Below that point, any previously installed water- or air-cooling can simply be turned off or disconnected.

Temperature control engineers will welcome these and many other new concepts of design built into this highly versatile temperature detector.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

Jrl. Ad N55(1)



FEinc STRING DISCHARGE

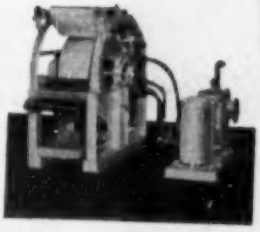
Gives your Filtration a Lift

Because the famous FEinc String Discharge actually *lifts* the filter cake from the revolving drum, it gets rid of most of your maintenance headaches and may save you thousands of dollars yearly.

As shown above, the filter cake is deposited to just the right thickness on closely spaced strings that pass around the drum. After the cake is thoroughly dewatered, the strings pick it off and support it to the small-diameter discharge roll.

There's no scraper, so cloths last longer, and don't plug up. No compressed air blow-back, so there's no filtrate returned to the cake, no wire winding to impede cloth changes. Handles cakes as thin as 1/16", including semi-colloids and slimes, with no limit to thickness. Other FEinc features solve washing and drying problems, too.

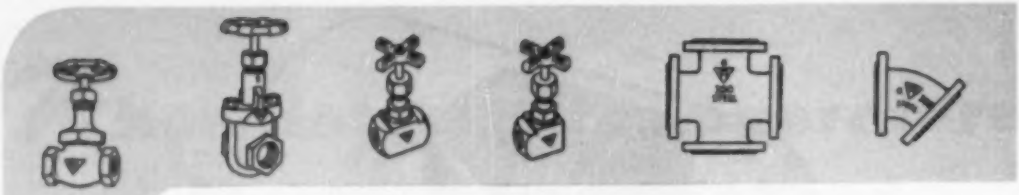
Yes, you don't have to put up with frequent cloth changes, blow-back, or scraper-clogged filter fabrics that are too heavy for good results. Consult the wide experience of Filtration Engineers first.



FEinc Pilot Plant Filter, with String Discharge and Washing Mechanism, available on rental-purchase plan. Write for complete details.

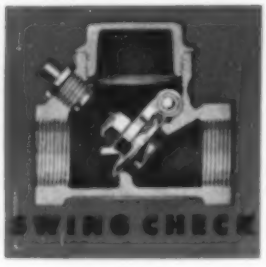
FILTRATION ENGINEERS, INC.

155 ORATON STREET **NEWARK 4, N. J.**

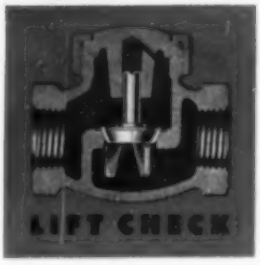


Quick-Acting · Positive · Dependable

BRONZE CHECK VALVES by R·P&C



• For use where flow is not pulsating—where velocity is low or moderate. Has renewable disc, regrinding seat. Disc free to rotate, thus distributes wear uniformly over disc and seat.



• For services where flow is pulsating or velocity high. Generally used with Globe and Angle valves. Resistance to flow greater than Swing Check. Suitable in horizontal lines only.

***For information** about bronze, iron and steel globe, angle and check valves — bar stock valves — iron cocks — cast steel fittings — get in touch with your R·P&C distributor.*

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It's the name for *creative* mixing devices. Nobody else can use it.

It belongs to one company that specializes in helping you to do successfully the more difficult jobs requiring mixing of liquids with liquids, solids and/or gases.

Industrial leaders everywhere have learned over the years that they can depend upon Turbo-Mixer to adapt the relevant factors of mixing from another industry and come up with a most effective mixing method for the specific job being studied.

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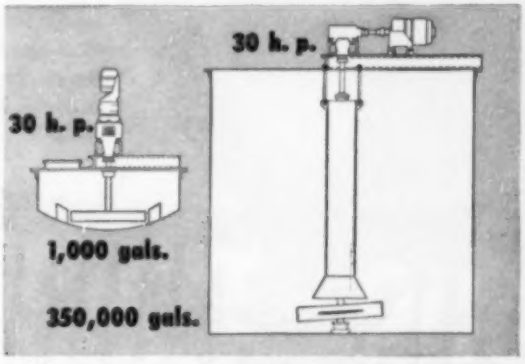
CONTROLLED AGITATION AND HORSEPOWER FOR THE SPECIFIC JOB

All Turbo-Mixers have an ample safety factor for continuous duty. All may be used 24 hours a day—every day—for years.



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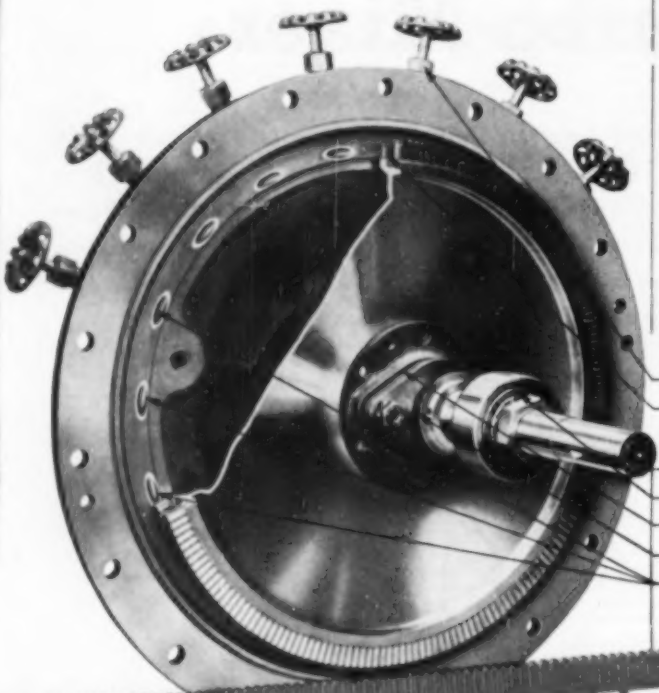
No other steam turbine offers you

SUCH VERSATILE STEAM NOZZLE CONTROL

The larger number of hand valves you see on a Coppus Steam Turbine promises you greater operating economy. At least 60% of the steam nozzles can be individually controlled to give maximum steam pressure in steam chest . . . a guarantee of best water rates at any load. Maintenance economy, too, is assured by the hard chromium plating of the shaft at the stuffing box. It provides the best possible smooth, non-corrosive surface for packing rings.



7 hand valves for efficient partial load operation, (20" turbine shown)

2 row velocity-stage turbine wheel with stainless steel turbine buckets — statically and dynamically balanced

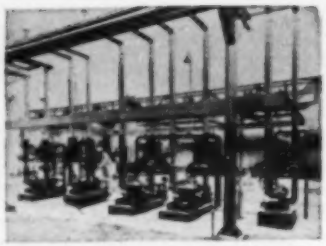
30-40 carbon steel shaft

Oversized double row deep grooved ball bearing

Stuffing box with metallic packing ring

Heavy chrome plating of shaft through stuffing box

3 nozzles always open



Coppus Steam Turbines, Type TF, driving chemical transfer pumps at Celanese Corporation of America's Chemcel Plant

Coppus Steam Turbines ranging from 150 hp down to fractional in 6 frame sizes

MAKE TURBINE DOLLARS GO FARTHER

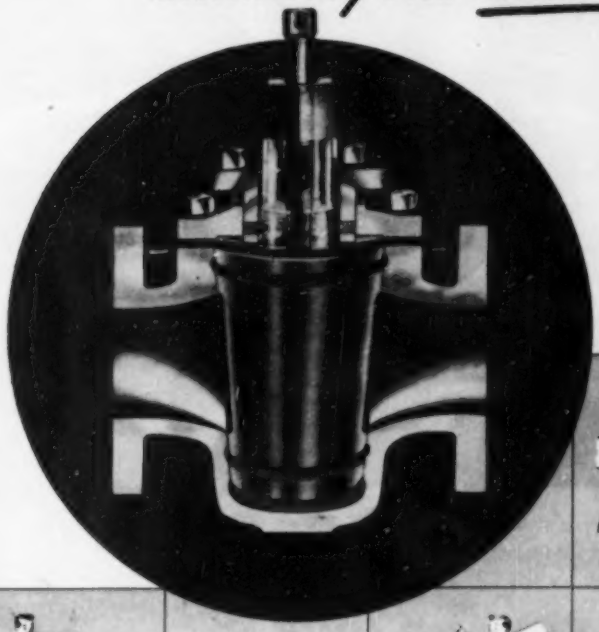
Why waste money buying turbines with higher horsepower ratings than you need? The higher the horsepower rating, the higher the price. Save money by selecting the Coppus Turbine size closest to your requirements from 150 hp down to fractional. And when you do, you save operating and maintenance costs, too. That's what these other Coppus features are designed to do: exclusive pilot operated excess speed safety trip supplementing constant speed governor; choice of metallic or carbon ring packing assemblies. Designs available for back pressures up to 75 pounds; replaceable cartridge type bearing housings. For full details . . .

WRITE FOR BULLETIN 135

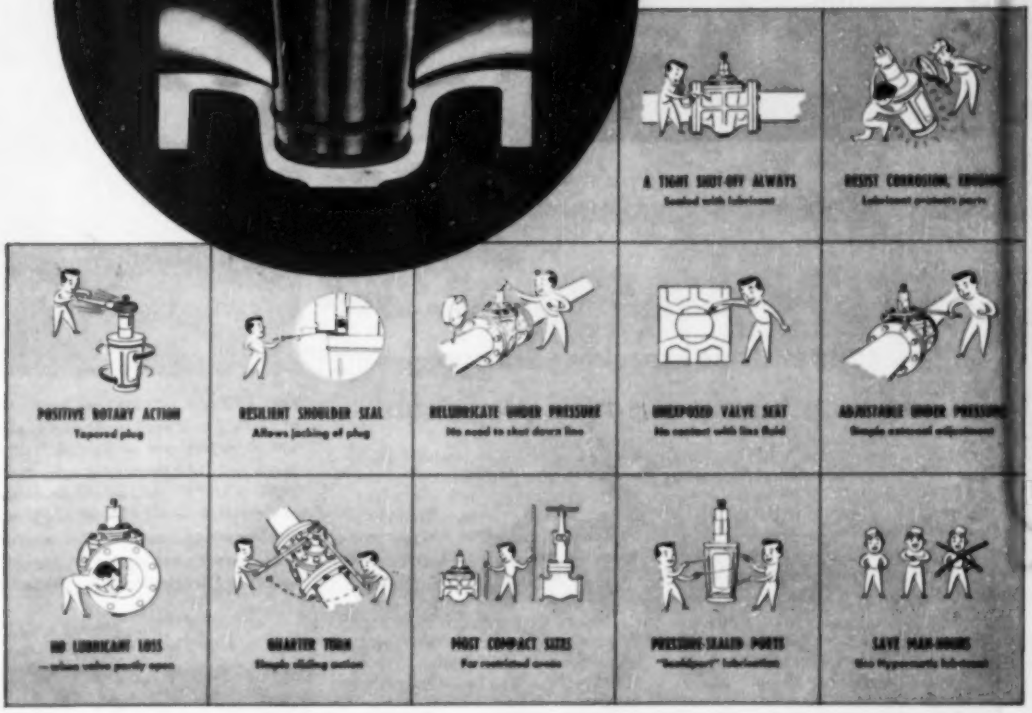
COPPUS ENGINEERING CORP., 223 Park Avenue, Worcester 2, Mass. Sales offices in THOMAS' REGISTER.

COPPUS "BLUE RIBBON" TURBINES

IN NO OTHER VALVE — *So many features and every one* ***IMPORTANT!***



Nordstrom lubricated valves have increased functional efficiency in the chemical processing industries and have solved many valve problems which only a lubricated plug design can accomplish. Corrosion and erosion are effectively resisted. *Keep upkeep down* with Nordstrom valves.



Nordstrom Valves

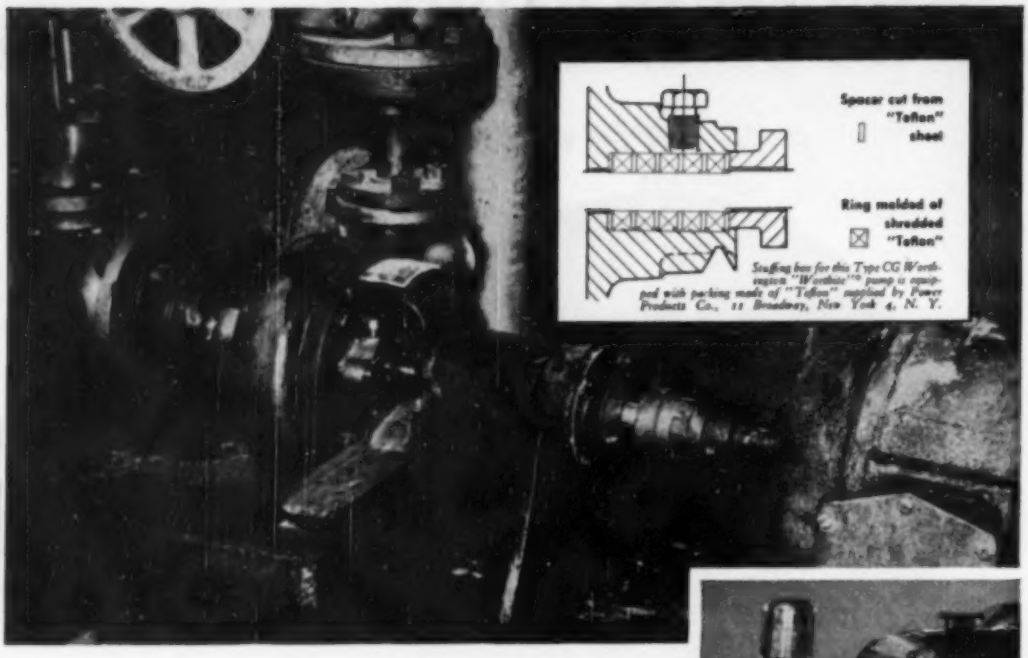
NOW AUTOMATICALLY LUBRICATED WITH *Hypermatic*

Trade Mark

***Nordstrom Valve Division*—ROCKWELL MANUFACTURING CO.**
400 North Lexington Avenue, Pittsburgh 8, Pa., Offices in all principal cities

Patent Applied for

Export — Rockwell Mfg. Co., International Division, Empire State Building, New York 1



Stuffing box for this Type CG Worthington "Worthite"® pump is equipped with packing made of "Teflon" supplied by Power Products Co., 11 Broadway, New York 4, N. Y.

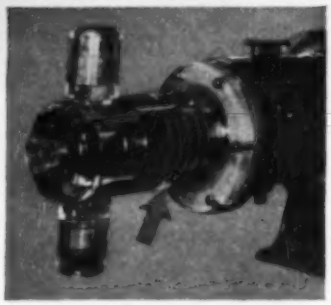
PACKING OF DU PONT "TEFLON"* LASTS UP TO 300 TIMES AS LONG

as conventional packing in pumps handling highly corrosive chemicals

"We use pumps to handle fuming sulfuric acid and used to repack them every two days," reports one manufacturer. "In 1947, we packed our pumps with 'Teflon.' We haven't had to repack them since." This is a typical example of the extraordinary chemical-resistance of Du Pont "Teflon" tetrafluoroethylene resin.

In addition to withstanding the attack of practically all chemicals except molten alkali metals, "Teflon" exhibits remarkable heat-resistance . . . can be used over a temperature range of −320 F. to 500 F. These characteristics, plus its extremely low coefficient of friction, account for its outstanding performance in packing in the pumping of corrosive chemicals. In many cases "Teflon" has far outlasted any other packing material tried.

"Teflon" is supplied by Du Pont in standard shapes (rods, tubes, sheets and tape). Or we will recommend molders or fabricators who can supply finished parts of "Teflon."



HERE YOU CAN ACTUALLY SEE the packing of "Teflon" in a small proportioning pump with a stuffing box of Du Pont "Lucite"* acrylic resin. Like the packing in the Worthington pump, this packing consists of rings of molded shredded "Teflon" (dark rings) and spacers cut from "Teflon" sheets (white rings). Pump is manufactured by Proportioneers, Inc., 29 Codding Street, Providence 1, R.I.

*REG. U. S. PAT. OFF.

CLIP THIS COUPON

E. I. du Pont de Nemours & Co. (Inc.)
Polychemicals Dept., Plastics Sales Offices: 350 Fifth Ave., New York 1, N. Y.; 7 S. Dearborn St., Chicago 3, Ill.; 845 E. 60th St., Los Angeles, Calif.

Please send me informative new booklet, "TEFLON for Gaskets and Packing in the Chemical Industry."

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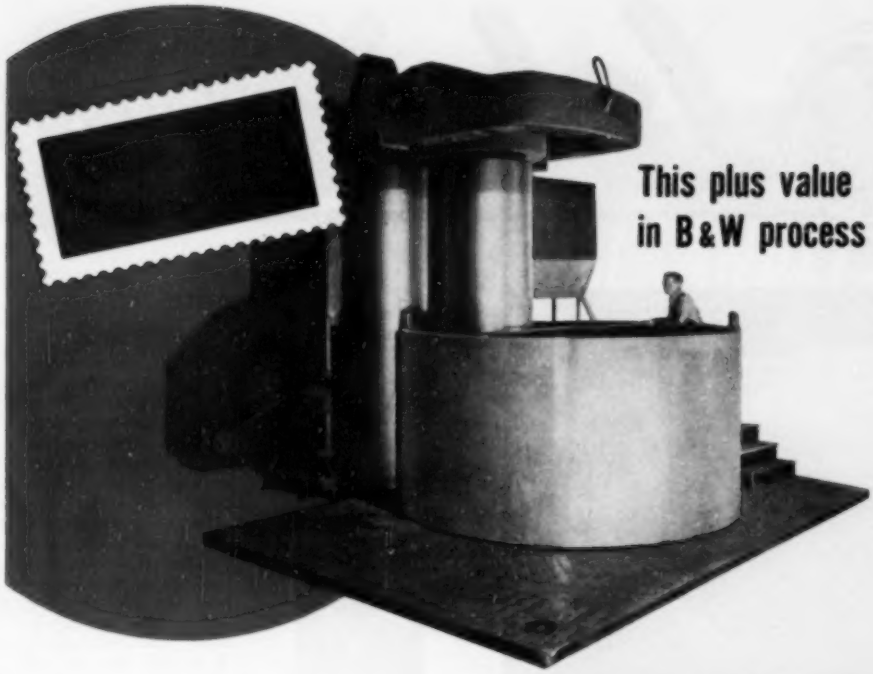
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY



This plus value in B&W process equipment

PAYS DIVIDENDS HERE

One of many extra values inherent in B&W refinery vessels is their perfect symmetry and freedom from localized stresses. Not only are the sections thoroughly annealed after welding, but in addition, are re-rolled to remove flatness at the welded seam, which otherwise would increase local stress as much as 10%. Such painstaking engineering, together with long, diversified experience and unexcelled fabricating facilities make B&W a leading source of refinery processing vessels that pay dividends in long, dependable, trouble-free service. The Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.

BABCOCK & WILCOX

B-91

GE Laboratory

How Electron Diffraction Instrument Helps NACA Search for High-Speed and High-Temperature Lubricants

To develop lubricants that will stand up under the high temperatures and high speeds of jet engines, the National Advisory Committee four years ago began to seek special lubricating materials. Playing an important role in this work is the G-E Electron Diffraction Instrument.

It quickly shows the reaction of a specific lubricant to a specific steel surface. You can use this research instrument to study catalysts, friction or wear, corrosion, surface deposits, graphites, pigment for paints, inks, dyes, and metals.

Write for Bulletin GEA-4905. Apparatus Department, General Electric Co., Schenectady, New York.

G-E X-RAY PHOTOMETER

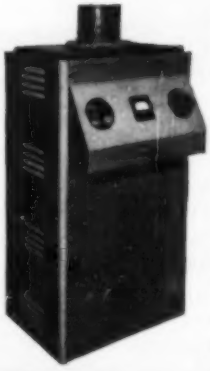
For analyzing solids, liquids, or gases

This instrument, used to determine the concentration of one element or compound in the presence of others, speeds up routine tests required in process control.

For example, a technician can quickly determine the tetraethyl lead content of gasoline, or the chlorine and sulphur content of oils. The instrument does not destroy the samples. ***Write for GEC-412.***

G-E ULTRASONIC GENERATOR

For industrial research in ultrasonics



To help you carry on industrial research made possible by the development of ultrasonics, General Electric offers this new ultrasonic generator for:

Studying oxidation, hydrolysis, and reduction

Transforming immiscible liquids into stable emulsions

Some plants, for example, are investigating the use of ultrasonics to degrease products and to develop improved fuels. ***Write for GEC-544.***

FOR HELP ON your measuring and testing problems . . . call the nearest G-E sales office.

Products for CHEMICAL ANALYSIS

G-E RECORDING SPECTROPHOTOMETER

For analysis by color measurement

By using the spectrophotometer to analyze chemicals, dyes, paints, inks, etc., you can speed up your laboratory research work or factory production, and at the same time help maintain quality control.

For example, the textile industry uses this instrument to determine the strength of incoming shipments of dyes and to speed up color matching on production. ***Write for Bulletin GEC-307.***

G-E spectrophotometer makes permanent records of colors.

G-E DEWPOINT RECORDER

To determine the moisture content of gases

The dewpoint recorder, which records the moisture content of gases, helps you to maintain close quality control of factory processes, thereby reducing spoilage.

For example, you can quickly determine the humidity of gases purchased or manufactured by you for use in your plant. Or you can use the dewpoint recorder to control mechanical or chemical dryers, and furnace atmospheres. The equipment is also helpful in carrying on research. ***Write for GEC-4613.***

Dewpoint recorder continuously records dewpoint temperature.

G-E MASS SPECTROMETER

For chemical analysis by mass separation

The improved G-E mass spectrometer automatically and accurately records mass concentrations over the mass range of 1 to 300. Readings are direct.

It is well suited for:

routine process control
research using isotopes
study of reaction rates
detection of impurities

Write for GEC-587.

G-E mass spectrometer gives direct readings—no waiting for photographs.

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BUFLOVAK *Low Temperature Evaporators*

...for Concentrating Delicate Heat-Sensitive Liquids

Are Designed In a Wide Range of Sizes

...To Meet Your Exact Requirements

...To Make Operating Economies Possible

...And to Assure You a BETTER PRODUCT!

1. BUFLOVAK LOW TEMPERATURE EVAPORATORS safeguard and preserve the delicate quality of your product by providing extremely rapid concentration and short exposure to the heating surface at extremely low temperatures.

2. Even the most delicate heat-sensitive liquids are "safely" concentrated—with no product contamination from the heating medium.

3. The choice of three methods of heating and condensing are available: (a) refrigeration, including a heat pump (b) Steam jet thermo compression system (c) mechanical vapor compressor—all in many sizes!

4. Regardless of your requirements, there is a size for your need. And, to assure you of the right size, read in the box below how Buflovak's Research and Testing Laboratory helps you decide *before you buy!*

5. These Low Temperature Evaporators truly provide *many* operating economies such as virtually complete recovery of concentrated material . . . uniform processing...and the outright purchase of the unit—*no rentals or royalties to deduct from profits!*

6. *Always*, a better product! Buflovak Low Temperature Evaporators maintain desired operating conditions, including the density of your product, within extreme close limits.

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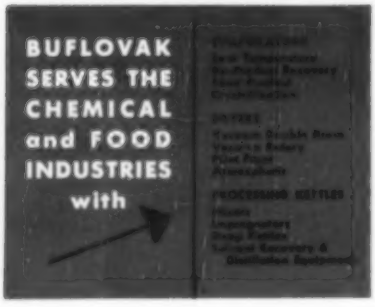
BUFLOVAK SERVES THE CHEMICAL and FOOD INDUSTRIES with



BUFLOVAK RESEARCH AND TESTING LABORATORY

To assist you in the solution of processing problems and to develop more efficient production methods, Buflovak offers the free facilities of its Research and Testing Lab. ...where small scale experimental units show you, *before* you buy, the commercial possibilities, data on production cost, and characteristics of the finished product. Over 6,000 tests made to date. Let us make a test of your product—in strict confidence, of course.

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. . . RELIANCE EXPLOSION-PROOF MOTORS
with Corrosion-Resisting Features

CLASS I, GROUP D DESIGN

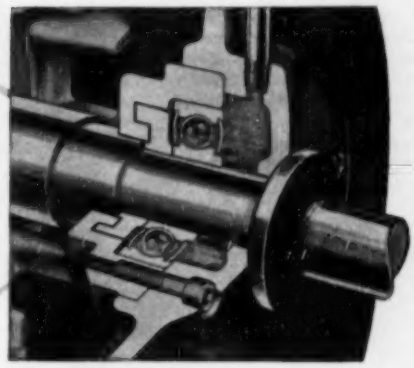
RELIANCE *Precision-Built* MOTORS

These special application motors are PRECISION-BUILT for safe operation in hazardous locations and manufactured to the standards of the Underwriters' Laboratories for Class I, Group D or Class II, Group F and G. With the addition of cable outlet, they will also meet the standards of the U. S. Bureau of Mines for use on permissible equipment.

An "extra" of vital importance in many locations is the high degree of corrosion-resistance provided by such features as monel name plates, grease pipes and shaft "slingers" and heavy, non-sparking bronze fans. In addition, all joints are sealed, all fits precision-finished, all cap screws made of heat-treated steel and immersed in asphaltum before assembly. Write today for Bulletin C-130 which gives further information you will want to have on Reliance Explosion-Proof Motors, or phone your nearest Reliance representative.

. . . an explosion-proof design for the RELIANCE PRECISION BEARING MOUNTING!

The Reliance Precision Bearing Mounting which has proved so successful in providing longer bearing life is made explosion-proof through a lengthened path from the bearing to the inside of the motor. Illustrated at right: Cross-sectional view of front end bearing, frame 204.



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Now EVERY laboratory can use modern spectrophotometric methods

THE BECKMAN MODEL "B"

accuracy . . . speed . . . simplicity

AT A NEW LOW PRICE

Spectrophotometric measurements—based on analysis of liquid, solid or gaseous samples by light absorption—have become one of the most important methods of today's process control operations. Complicated analyses requiring hours to perform by standard chemical procedures are now completed in a matter of minutes using modern spectrophotometric methods.

Up to the present, *quality* instruments have been beyond the reach of many laboratories. Now, however, the development of the new Beckman Model "B" Spectrophotometer makes available for the first time a *precision* instrument—convenient and simple to operate—*yet versatile, accurate and low-priced.*

The Model "B" combines many of the advancements pioneered in the famous Beckman Quarts and Infrared Spectrophotometers . . . high resolution . . . wavelength and photometric accuracy . . . freedom from stray light . . . wide spectral range . . . quality construction.

It features direct reading absorbance and transmittance scales . . . complete elimination of stray light from 360 to 1000 millimicrons—less than 1½% even at 320 millimicrons . . . interchangeable phototubes for wider wavelength range . . . inexpensive sample cells . . . 4-position cell carriage for faster readings . . . and many other important features.

The Model "B" is by all standards the outstanding instrument in its field. Write for full details. *Beckman Instruments, National Technical Laboratories, South Pasadena, 14, Calif.*

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The "Model B" is *THE* Ideal Instrument For Simplifying Routine Analyses

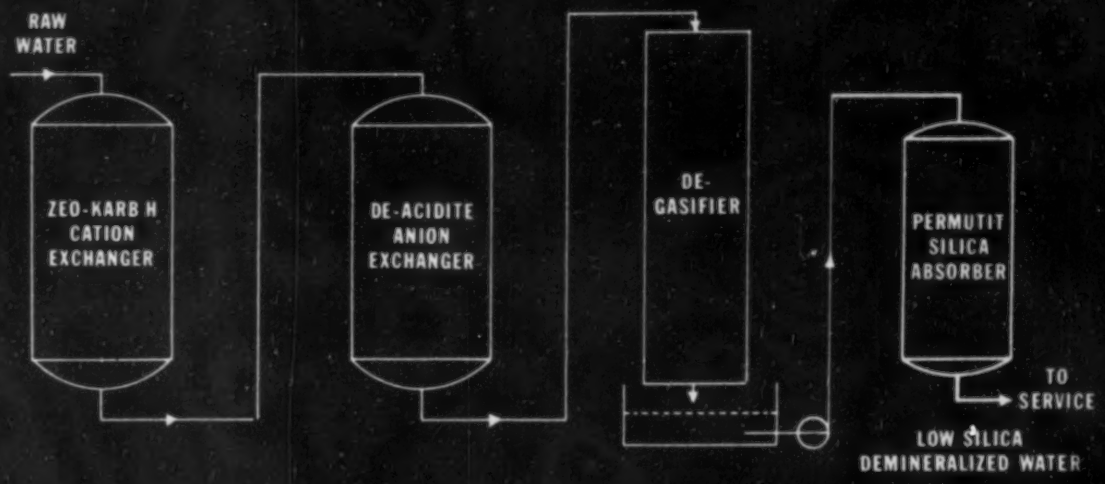
Regardless of the nature of your laboratory operations—determination of impurities, control of quality, simplifying process control, color matching and control, or any of a wide range of other procedures—chances are you can speed up your analyses and greatly simplify your work by adopting modern spectrophotometric methods.

But remember—**the accuracy and reliability of spectrophotometric analyses are no better than the instrument you use.** So be sure to check all the features of the Beckman "Model B" Spectrophotometer—compare this instrument point by point with **any** other in its field—and you'll readily see why it is, by all standards, the outstanding spectrophotometer in its price range.

Here is an instrument carefully engineered so that stray light effects are negligible . . . an instrument where readings can be reproduced on sample after sample without "drift" or other inaccuracies . . . where band widths can be readily varied to permit the high resolution required in many analytical problems . . . where a variety of absorption cells can be used interchangeably to provide optimum path lengths . . . and where many other outstanding features are provided to assure maximum versatility, accuracy and dependability.

Be sure to get the full details on the many money-saving, time-saving applications for the Beckman "Model B" in today's chemical laboratories . . . and on the many unique advancements built into this instrument that make it such an outstanding value in its price range. **See your authorized Beckman dealer—or write direct for complete data.**

✻ Beckman Instruments include: pH Meters and Electrodes * Spectrophotometers — Radioactivity Meters — Special Instruments



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HERE'S AN ECONOMICAL NEW CHEMICAL PROCESS FOR PRODUCING THE EQUIVALENT OF DISTILLED WATER!

The Permutit® two-step Demineralizing process utilizes Zeo-Karb H, Permutit's acid-regenerated cation exchanger to replace metallic cations with hydrogen ions, converting salts present into corresponding acids. These acids are then removed from solution by De-Acidite, Permutit's resinous anion exchanger.

Permutit has pioneered by adding to the Demineralizing process a new, one-step cold process silica removal treatment which removes silica down to less than 0.5 p.p.m.—making possible ideal, low silica, demineralized boiler-feed make up!

• • •

For information about this revolutionary new, low first cost, low operating cost treatment, write The Permutit Company, Dept. CE-3, 330 West 42nd Street, New York 18, N. Y., or the Permutit Company of Canada, Ltd., Montreal.

**Trade Mark Reg. U. S. Pat. Off.*

for 36 years

Permutit

WATER CONDITIONING HEADQUARTERS

Alcoa Heat Exchanger News

PUBLISHED BY THE ALUMINUM COMPANY OF AMERICA

HEAT EXCHANGER SAVINGS $50,000

Many plants now save up to 80% of their tube costs!

A switch to Alcoa Aluminum Heat Exchanger Tubes can save 30%, 50% or 80% of your present tube expense, depending upon the type of tubes you now use. This amounts to a yearly savings of about $50,000.00 for the representative chemical plant:

Roll-in of Alcoa Tubes is easily accomplished with standard tools and equipment. And aluminum's lightness speeds installation and fabrication.

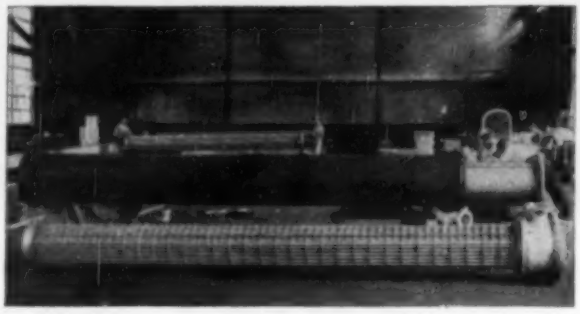
Alcoa Tubes safely process hundreds of chemicals. Stand up in most fresh and salt cooling waters. Aluminum tubes increase in tensile, yield and show no evidence of embrittlement in sub-zero applications as low as −320° F. They successfully handle steam up to temperatures slightly over 400° F. Their heat transfer and fluid flow characteristics equal or exceed tubes of other metals.

For complete information about Alcoa Tubes and name of your nearest supplier, call your local Alcoa sales office. Or write: ALUMINUM COMPANY OF AMERICA, 1490C Gulf Building, Pittsburgh 19, Pennsylvania.

* * *

ALUMINUM COMPANY OFFERS NEW BOOK

This new, 24-page booklet will answer many of your questions about Alcoa Tubes. It covers fabrication techniques . . . alloy selection . . . applications both chemical and petroleum. It describes tube cleaning, the use of inhibitors and methods of cathodic protection. It contains complete information on fluid flow and heat transfer characteristics, plus tables of physical properties and specification data. Write for your free copy, today. ALUMINUM COMPANY OF AMERICA, 1490C Gulf Building, Pittsburgh 19, Pennsylvania.



ALUMINUM TUBES LAST 20 YEARS IN CHEMICAL HEAT EXCHANGERS

In 1927, little was known about the service life of Alcoa Aluminum Heat Exchanger Tubes. But Hercules Powder Company was impressed by the recommendations of Alcoa's engineers. They installed Alcoa Tubes in their rosin producing plant at Brunswick, Georgia. For 20 years, these Alcoa Tubes withstood attack by cooling waters and furfural gasoline mixtures. They never corroded. In fact they proved doubly effective. Color control is very important in rosin production. These Alcoa Tubes never discolored or contaminated the product.

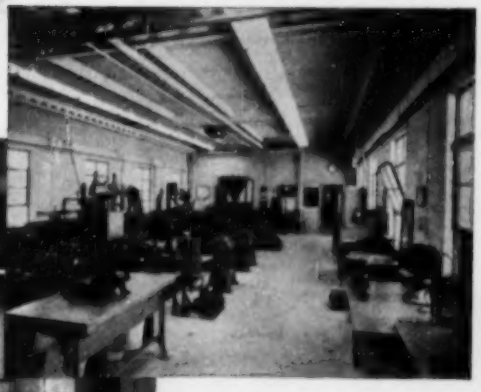
This case history is typical of the service data Alcoa offers for literally hundreds of chemical and petroleum applications. Consult your local Alcoa sales office, or write Alcoa direct.

TWO TYPES OF TUBES NOW MADE BY ALCOA

Now you can select the type of Alcoa Tube that best suits your application. Bare for product to product service. Alclad (inside) for contact with cooling waters. Both cost less than tubes of any other metal. Both offer additional savings in fabrication and installation.

In the Baker Perkins laboratory, *men who know processing* run many tests each week on plastic masses, paints, gums, slurries and other materials which require mixing or centrifuging. Even though every problem they tackle is different—they are experienced and *have facilities to determine the best method* of processing almost any given chemical material.

By getting right to the core of the mixing problem that each specific material requires, these B-P laboratory men are able to *determine precisely the best speed, temperature, pressure and other conditions* at which a material should be processed. The size and type of equipment that will process it most efficiently is then recommended.



The B-P laboratory is at your service to help you reduce processing costs and improve the quality of your products. Write for information.

BAKER PERKINS INC.

CHEMICAL MACHINERY DIVISION

SAGINAW, MICHIGAN

TUBES

TUBES

. . . TUBES

. . . Nothing but tubes

B&W Tube Co. representatives are pass-keys to all tubing problems—pressure or mechanical . . . carbon, alloy, or stainless . . . special shapes . . . tailor-made physical and chemical properties. They sell tubes, tubes, nothing but tubes. Their factory training in "tube-technics" embraces everything from material selection to method of shipment. They are experienced in uncovering unexpected tubing economies. There is one near you. Ask him. He knows!

B&W SEAMLESS and WELDED TUBES

THE BABCOCK & WILCOX TUBE COMPANY

General Offices: Beaver Falls, Pa.

Plants: Alliance, Ohio, and Beaver Falls, Pa.

Sales Offices: Alliance, Ohio • Beaver Falls, Pa. • Boston 16, Mass. • Chicago 3, Ill. • Cleveland 14, Ohio • Denver 2, Colorado Detroit 26, Mich. • Houston 2, Texas • Los Angeles 15, Calif. • New York 16, N. Y. • Philadelphia 2, Pa. • St. Louis 1, Mo. • San Francisco 3, Calif. • Syracuse 2, N. Y. • Toronto, Ontario • Tulsa 3, Okla. • Vancouver, British Columbia

TA-152 3

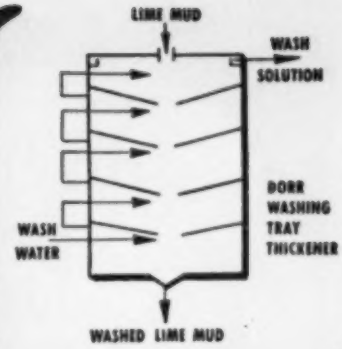
both

Continuous

Counter-

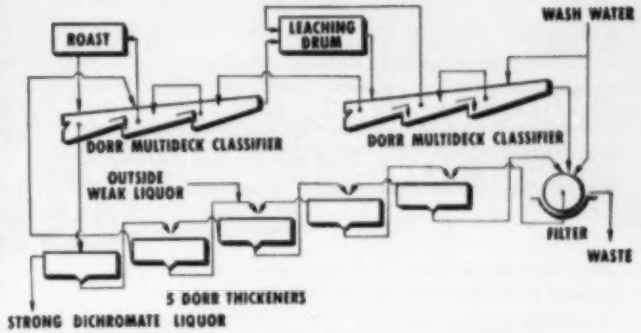
Current

Decantation



CCD at its simplest . . . one Dorr Washing Thickener, one Dorrco Pump. Used in the recausticizing step at chemical pulp mills to separate soda values from lime mud. Solids pass downward, compartment by compartment . . . values are transferred to a continuous upward flow of wash solution.

But what a difference!



Still CCD . . . but what a difference! This flowsheet uses two Dorr Multideck Classifiers, five Dorr Thickeners, five Dorrco Pumps, a leaching drum and filter. Chrome roast is continuously leached to yield a strong sodium dichromate liquor for evaporation. Insoluble waste product contains less than 1% of chromate values.

Large or small tonnages . . . simple or complex flowsheets . . . Dorr CCD Systems have been the standard of the Chemical Industry for over 30 years. If you have a problem involving washing, leaching, thickening, or any related liquid-solids operation, Dorr equipment plus Dorr technology can go to work for you on a dollar-saving basis.

If you do not already have Bulletin 7001, Dorr Processing Equipment . . . covering the complete Dorr line for the Chemical Industries . . . write for your copy today.

DORRCO

THE DORR COMPANY, ENGINEERS
BARRY PLACE, STAMFORD, CONN.
NEW YORK • ATLANTA • TORONTO
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SUGAR PROCESSING
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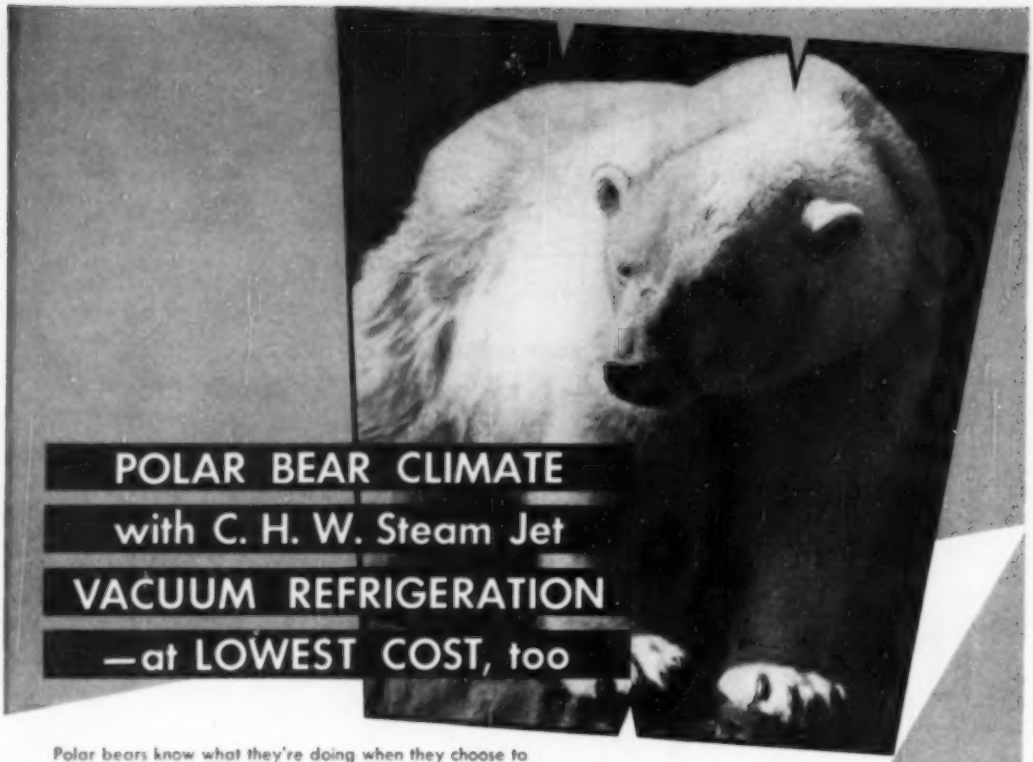
ASSOCIATES AND REPRESENTATIVES
Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World. Names and Addresses on Request.

DORR

RESEARCH ENGINEERING EQUIPMENT

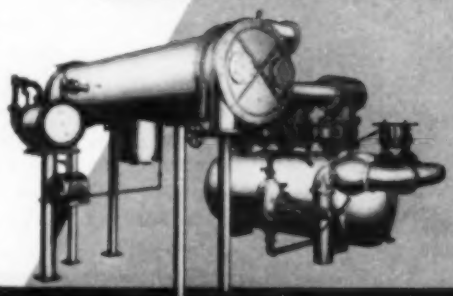


POLAR BEAR CLIMATE with C. H. W. Steam Jet VACUUM REFRIGERATION —at LOWEST COST, too

Polar bears know what they're doing when they choose to remain where they can depend on the constantly cold climate they need. You, too, can equally depend on C. H. W. Steam Jet Vacuum Refrigeration to give you required cooling conditions for your chemical or food process requirements. And, of equal importance, is its economy. When compared to mechanical types of refrigeration, C. H. W. Steam Jet Vacuum Refrigeration Systems are lowest in purchase price, lowest in installation cost and lowest in maintenance. (In many cases, the cost of operating a vacuum refrigeration system is 5 to 20% less than for an ammonia or carbon dioxide system for temperatures ranging from 35 to 60° F.) Furthermore, since water is the refrigerant, hazards of noxious or poisonous ammonia, sulphur dioxide, etc. are eliminated. Cooling is by flash evaporation, using either live or exhaust steam. The system is easily operated and service life is long. For complete information on how C. H. W. Steam Jet Vacuum Refrigeration can be applied to your cooling problem, write now for Catalog No. 1462.

C. H. WHEELER MANUFACTURING CO.
1808 Sedgley Avenue, Philadelphia 32, Pa.
REPRESENTATIVES IN MOST PRINCIPAL CITIES

Photograph below shows a C. H. Wheeler Steam Jet Vacuum Refrigeration System employing a Surface Condenser. , Low Level Jet and Barometric Jet (Direct Contact) Condensers can be used, depending on requirements.



C. H. Wheeler SINCE 1903

STEAM CONDENSERS · WATER COOLING TOWERS
EJECTORS · STEAM JET VACUUM REFRIGERATION
OF PHILADELPHIA

Multi-storage availability with ESSO SOLVENTS!

With water terminal and storage facilities in industrial centers, ESSO SOLVENTS are always conveniently *available*. Prompt shipment and quick delivery to your door is assured in any quantity . . . tank cars, tank trucks, or drums. Specify Esso Solvents for dependable delivery *when* you need them, *where* you need them.

YOU CAN DEPEND ON ESSO SOLVENTS FOR

- **MULTI-STORAGE AVAILABILITY** — water terminals in industrial centers.
- **MODERN HANDLING METHODS** — separate tank storage, pumping lines, tank cars and trucks, are used in all Esso Solvent handling operations. Prompt, efficient delivery to your door is assured.
- **UNIFORMITY** — made in modern refineries from carefully selected crude oil sources.
- **ECONOMY** — closely-controlled quality gives constant, efficient industrial processing, high-quality products.
- **CONTROLLED EVAPORATION** — available in a wide range of evaporation rates with precise characteristics to meet your requirements.
- **SOLVENCY** — Esso aliphatics and Solvesso aromatics cover both high and low solvency ranges.

Controlled high quality helps produce larger profits with versatile, dependable Esso Solvents.

Esso PETROLEUM SOLVENTS

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ESSO STANDARD OIL COMPANY — Boston, Mass. — New York, N. Y. — Elizabeth, N. J. — Philadelphia, Pa. — Baltimore, Md. — Richmond, Va. — Charleston, West Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — Little Rock, Ark. — New Orleans, La.

FOR TECHNICAL ASSISTANCE

If you have a solvents problem or want further information on the specifications and characteristics of Esso Solvents—write or call our office nearest you. Our technicians will be glad to assist you.

HERE'S HOW TO REDUCE YOUR TOP-HEAVY V-BELT INVENTORY

..and keep your machines producing

WE'RE not the people to solve *all* your stockroom inventory problems—but, when it comes to stocks of v-belts, we can help.

There's no need to tie-up money and valuable stockroom space with hundreds of sizes of endless v-belts. Four reels of Veelos, the adjustable v-belt, can *replace* up to 316 sizes of endless v-belts—in the O, A, B and C widths. You may not use all these widths. If not, one or two reels of Veelos may be enough.

Veelos is easy to install without dismantling outboard bearings. Veelos runs true—delivers steady, full, vibrationless power. Veelos cuts down on machine maintenance because uniform tension can be maintained on all belts—relieving strain on bearings.

You *save* when you shift to Veelos.

WRITE FOR YOUR COPY

of the Veelos Data Book. It gives complete engineering, measuring and installation information on Veelos v-belts.

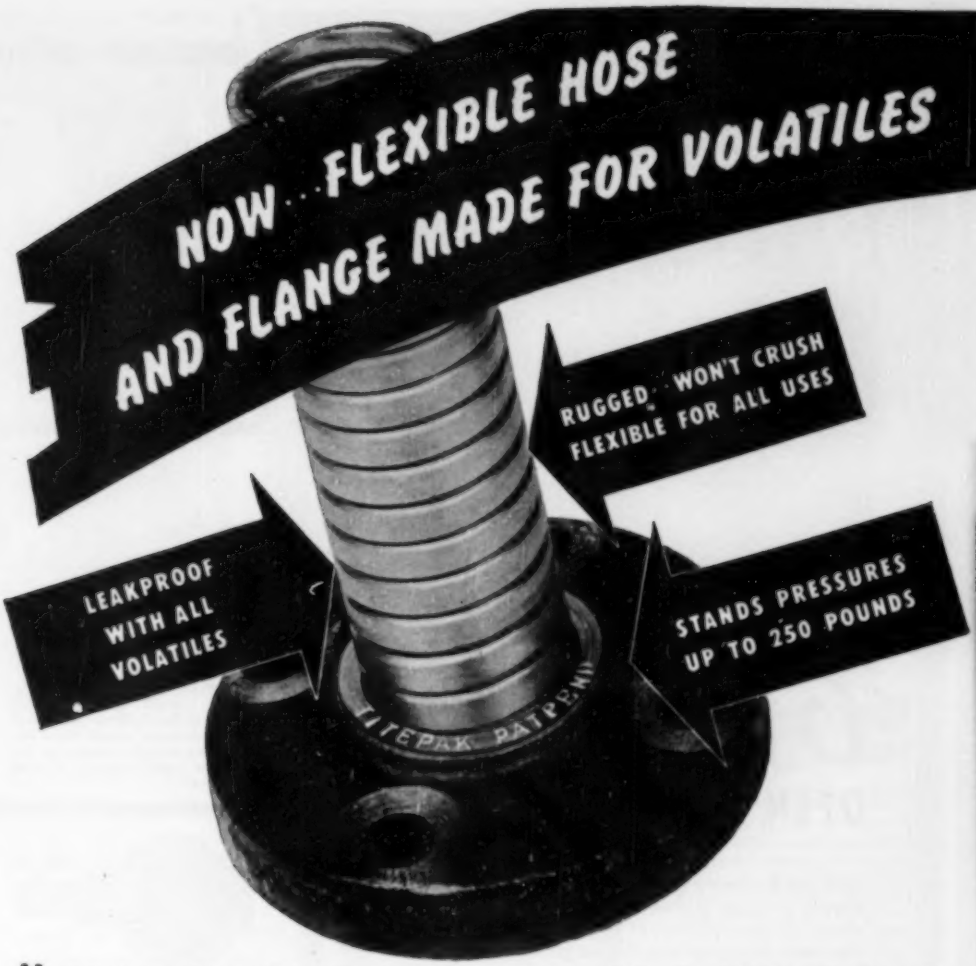
MANHEIM MANUFACTURING & BELTING COMPANY • MANHEIM, PA.

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all standard widths, fits all standard grooves. Three types: regular, oil-proof, static conducting. Double V in A and B widths. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. Veelos is known as VEELINK outside the United States.

VEELOS
THE LINK
V-BELT

NOW...FLEXIBLE HOSE AND FLANGE MADE FOR VOLATILES



Here's the hose and flange that will handle highly volatile liquids . . . will not leak . . . yet is rugged . . . tough . . . and flexible.

Developed especially for the petroleum and chemical industries, this new Penflex hose has been tested and performance-proved. It will withstand pressures up to 250 pounds and has proved its value in conveying oil, gasoline, kerosene and other volatiles. Available in sizes 2½" to 12" I.D.

The new Penflex Titepak Flange completes this leakproof assembly. It is leakproof under all conditions . . . lighter in weight than other types of flanges . . . and is much lower in price. Penflex Titepak Flange assures greater efficiency in handling volatiles . . . lasts longer . . . is more rugged . . . and is tamperproof.

Penflex manufactures a complete line of four wall interlocked and seamless welded corrugated flexible tubing for the petroleum industry . . . automatic barrel fillers . . . pneumatic rivet passers . . . and accessories and fittings. To cut your maintenance, write for your copy of "Flexineering at Work."

PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.

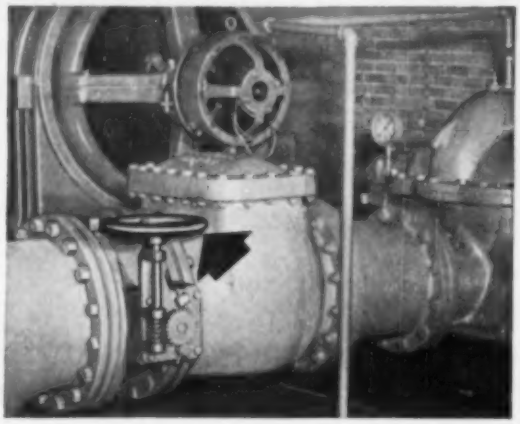
7234 Powers Lane **Philadelphia 42, Pa.**

Branch Sales Offices—BOSTON • NEW YORK • CLEVELAND • CHICAGO • HOUSTON • LOS ANGELES

Penflex... HEART OF INDUSTRY'S LIFE LINES

R-S valvEvents

• EXCERPTS FROM THE R-S BOOK OF EXPERIENCE •



6 HANDWHEEL TURNS OPEN OR CLOSE VALVE

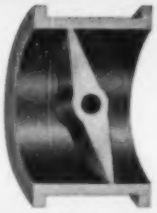
This quick closing feature is an important consideration in water pumping operations as illustrated above or any application where a battery of synchronous driven pumps discharges into a common header.

Normal procedure when starting a pump is to shut off the discharge valve until the pump has gained the desired speed. The valve is then opened gradually. Since it requires only a few seconds of an operator's time, this important operation is not likely to be neglected when R-S Valves are installed. Burned-out motors at start-ups can be practically eliminated.

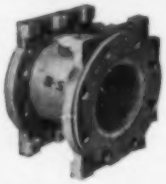
R-S Valves show substantial savings in pumping power due to low pressure drop. Consider also the compact design, light weight and self-cleaning features.

Consult with your local R-S representative. Look for the address and phone number listed under "R-S Products, Valves" or write direct.

R-S PRODUCTS CORPORATION
Wayne Junction • Philadelphia 44, Pa.



Sectional view shows beveled vane of R-S Valve firmly seated at a 12½° angle. A metal-to-metal seat gives satisfactory commercial shut-off in many cases. Manual or automatic control available.

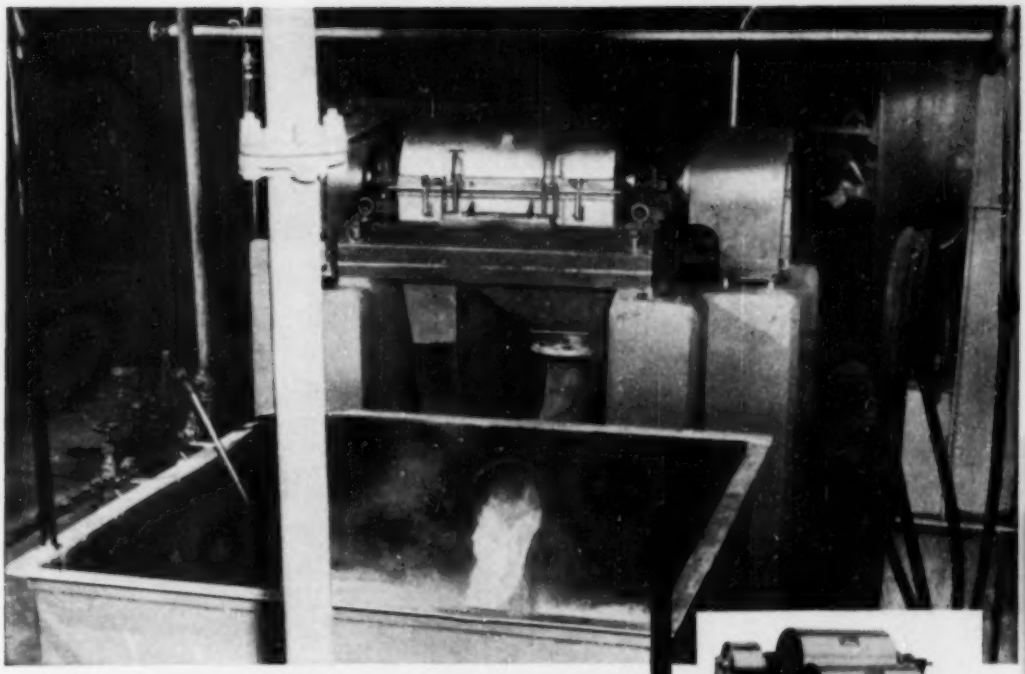


Drip tight or bubble tight closure can be obtained with a rubber seat. Under pressure, due to the 12½° angle of closure, the rubber yields both radially and longitudinally around the shaft-bosses and the periphery of the valve vane to insure positive shut-off.

No. 709 30-inch 50-pound valve equipped with rubber seat. Air bubble tight at 80 psig and drip tight with water at 100 psig. Fully enclosed gear reduction drive. Every R-S Valve is available in smaller and larger sizes, in all materials and for lower and higher pressures.

New!

Catalog No. 18 featuring R-S 50-pound valves is just off the press. Ask for it!



IT STEALS MONEY FROM THE SEWER

Many plants have needlessly accepted the loss of valuable solids in waste water and process liquors—believing them to be uneconomical to reclaim. The plant shown above formerly was one of them.

TODAY, continuous super filtration provided by the Sharples Super-D-Canter is not only removing solids economically, but it is doing so at a substantial profit.

In addition to removing solids, the Sharples Super-D-Canter is used for the clarification of liquids, or it is adjustable for use as a classifier: removing solids within a set size range.

The Super-D-Canter is continuous; both in the discharge of liquids and the discharge of solids. It can handle a wide range of slurries and do a better separating job because it develops the highest centrifugal force of any centrifuge of this type.

Complete information will gladly be sent to you.

TWO BASIC TYPES

The two types of Sharples Super-D-Canters provide for the successful handling of practically any slurry. Depending on individual characteristics, solids may range from 1% to above 50%.

The Sharples *Conical* Super-D-Canter is used for firm-bodied type solids; while the *Cylindrical* Super-D-Canter is especially designed for soft and amorphous, extrudable-type solids.

Since the Sharples Corporation manufactures *the complete line* of all centrifugals, you can always be assured that their recommendations are impartially based on the best fulfillment of your particular requirements.

THE SHARPLES CORPORATION

NEW YORK 17, N.Y. CHICAGO 4, ILL. BOSTON 10, MASS. SAN FRANCISCO 5, CALIF. CLEVELAND 15, OHIO

EXECUTIVE OFFICES AND FACTORY, 2300 WESTMORELAND STREET, PHILADELPHIA 40, PENNA.

BIG business

Making an item like this is a job for a big plant—one with a set-up and experience in building important units. It's big business any way you look at it, and Sun Ship, with its vast facilities, experience and know-how, is the outfit able to handle it . . .

The 11′ x 139′ Deisobutanizer Column pictured above is a sample of the Sun-built refinery and chemical plant equipment that has made the name Sun Ship as famous on land as the Sun-built tankers and cargo ships that ply the seven seas.

Sun

SHIPBUILDING & DRY DOCK COMPANY

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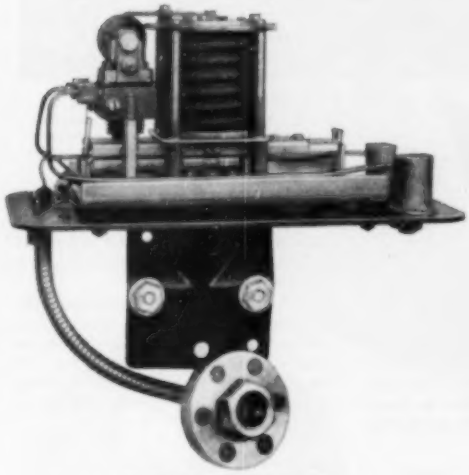
25 BROADWAY • NEW YORK CITY

Changing temperatures or pressures instantly and accurately measured by Taylor TRANSAIRE* Transmitters



PRESSURE:

New Taylor TRANSAIRE Pressure Transmitter with narrow range spans lets you measure and transmit minute pressure changes up to 1000 feet. Works on simple force-balance principle. Accurate to $\frac{1}{2}\%$ of the selected short range span (*conventional devices are only accurate up to* $\frac{1}{2}\%$ *of upper range limit*). Sensitive to pressure changes of $\frac{1}{52}$" water. Here's accuracy and sensitivity never before possible in pressure measurement—plus the convenience of suppressed ranges at high pressure levels.

SEVEN IMPORTANT ADVANTAGES:

1. Range spans of 20 and 40 psi available throughout range limits of 35 to 415 psia.

2. Volumetric type pressure system is extremely accurate, practically clog-proof, has corrosion-resistant 316 stainless steel diaphragm.

3. Temperature and barometric compensation for higher accuracy of measurement and control.

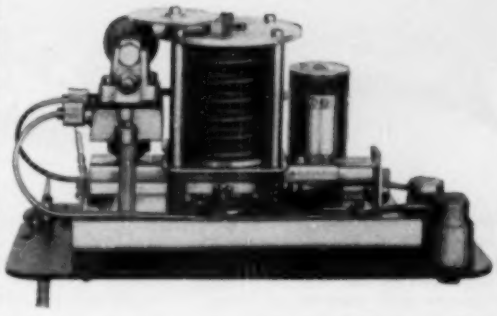
4. Perfect for many jobs, especially thin fractionating columns.

5. No individual calibration of receivers or controller—thanks to standardized 3 to 15 psi output air pressure.

6. Simple screwdriver adjustment for shifting the operating ranges.

7. Interchangeable manifold assemblies make 20 and 40 psi range spans optional.

*Trade-Mark



TEMPERATURE:

New Taylor TRANSAIRE Temperature Transmitter with Speed-Act* lets you measure and transmit smallest temperature changes up to 1000 feet with instant accuracy! The *only* temperature transmitter that gives you:

1. DYNAMIC ACCURACY—which means the accuracy of an instrument in measuring changing or dynamic conditions. Transaire Dynamic Accuracy is unparalleled. Solves the problem of process engineers who realize that an instrument accurate to a fraction of a degree in measuring static conditions can be in error by many degrees when temperature is changing.

2. DYNAMIC COMPENSATION—which means ability to compensate for inherent lags both in measuring system and rate of heat transfer of process medium. Transaire does this by introducing derivative action (Speed-Act) into the *measuring* circuit. The result is Dynamic Accuracy, with a speed of response seldom thought possible which permits much closer automatic temperature control.

▼ ▼ ▼

For complete details, write for **Bulletin 98140** on TRANSAIRE Temperature Transmitter, and **Bulletin 98099** for TRANSAIRE Pressure Transmitter. Ask your Taylor Field Engineer! Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

DEHYDRATING, MOLASSES REFINING, and CANNING PROCESSES at TEXSUN CITRUS EXCHANGE

Demonstrate Versatility of GAS

TEXSUN CITRUS EXCHANGE PLANT, WESLACO, TEXAS. Dehydrating and concentrating plant is shown at upper right, where cloud of vapor indicates evaporation of moisture from dehydration of citrus peel.

CITRUS BY-PRODUCTS processing is a large part of the operations of Texsun Citrus Exchange, Weslaco, Texas. One of the world's largest processors and canners of citrus, Texsun not only packs juices and edible fruit but processes the residue into citrus molasses and citrus pulp used in stock feeds.

Although Gas is used for all Texsun heating operations, its major role is in the dehydration and refining process. The rotary kiln method, which consists of eight 90′ kilns with a total capacity of 40 tons of raw products per hour, is the dehydration process which completely dries the pulp and peel.

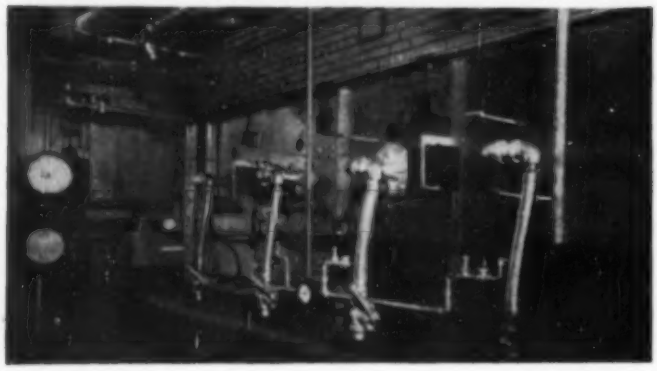
A unique method developed by Texsun, to purify and retard fermentation of their citrus molasses products, is to inject natural gas and air directly into the liquid, igniting it and causing it to heat as it bubbles to the surface.

Sid Rankin, Supt. of Dehydration at Texsun emphasizes the importance of retaining color and vitamin value in the finished product, which requires heat-processing at precise temperatures just below the boiling point. Mr. Rankin states—"We could not turn out a product of such high quality without the use of natural gas as it is readily controlled and is very economical. In our patented process in the manufacturing of citrus molasses, natural gas is indispensable."

Texsun has used GAS for heat-processing since the Weslaco plant was built in 1936. These applications of GAS represent some of the important ways in which GAS serves the food industry. Ask your Gas Company Representative about other heat-processing applications in your business.

Battery of Gas-fired dryers from firing end, and showing control panel. Kilns are 90 feet long, with 30 foot firing chambers.

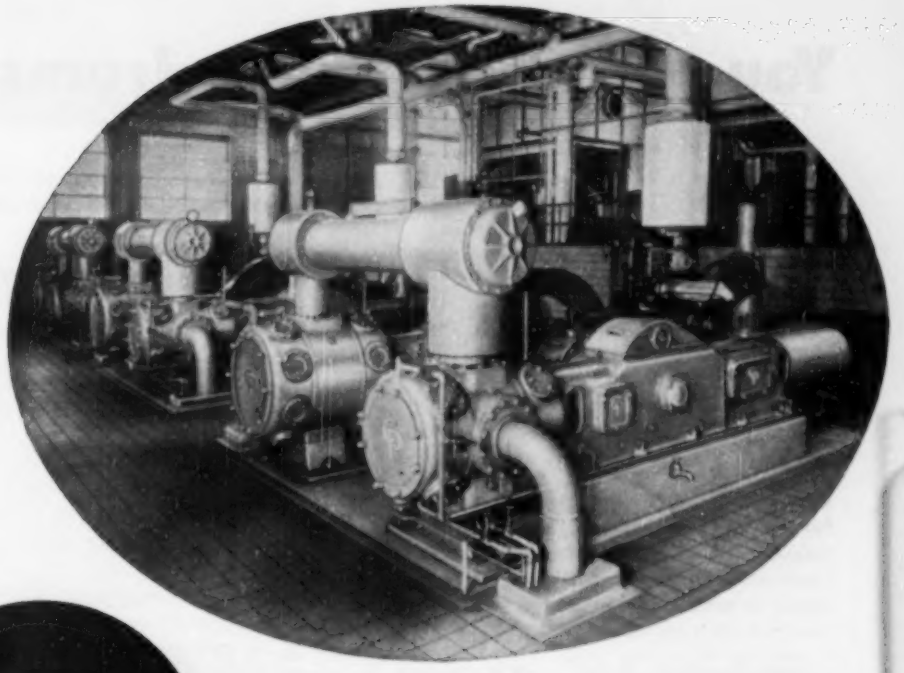
Gas Burner on one of the boilers which generates steam for processing.



MORE AND MORE... THE TREND IS TO GAS

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE
NEW YORK 17, NEW YORK



low cost air where steam is available

In plants with ample boiler capacity, compressed air requirements can be met effectively, at low cost, with the Chicago Pneumatic Type H Steam-Driven Compressor.

Of horizontal duplex design, its dependability and economy over a wide range of operating conditions are assured by such features as: (1) economical steam end proportioned to the plant's steam conditions; (2) automatic cut-off governor; (3) efficient air end, with Simplate valves.

Capacities of the Type H range from 900 to 7400 c.f.m., 100 to 125 pounds pressure. Other sizes of CP steam-driven compressors are available in single and multi-stage designs for lower and higher pressures.

Write for Bulletin 729.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

You can't beat these drums!

Your product may be one of the thousands of items for which a fibre drum is just about the perfect package. And there are some thumping good reasons why a Continental fibre drum is the best drum you can use.

Continental fibre drums can't be beat for rugged durability. They give extra protection to both expensive and dangerous articles for shipment either in this country or abroad. The closures are tight and strong—but easy to open and close.

Continental fibre drums can't be beat for shipping economy. Their light tare weight means savings at today's high freight rates—even greater savings on export shipments to countries where import duties are levied on the gross weight.

Continental fibre drums can't be beat for appearance. They are neat and trim, tailored to your product. and feature quality printing or spray painting. Each Continental drum is a style leader in its field.

Most important, Continental can't be beat for service. There are four strategically located Continental fibre drum plants ready to give you fast, economical and dependable service. Continental packaging engineers are always ready to give you sound advice on packaging problems. Backing up these engineers is a modern laboratory staffed with qualified research and development people.

Continental is big enough and flexible enough to handle any situation. Again and again Continental customers say, "You make us feel as though your fibre drum department is part of our own company." We'd appreciate an opportunity to show you how much real help and service we can deliver.

These drums can help you boom sales

1. The famous Continental LEVERPAK drum with its unique lever-locking device gives maximum protection under hard usage. 12- to 75-gallon sizes.
2. Continental FIBERPAK drum . . . a rigid, all-fibre container in ¼- to 67-gallon sizes.
3. Continental STAPAK drum. Has fibre body with metal top and bottom. Supplied in 2- to 32-gallon sizes.
4. Continental UPAK drum. Custom-made for the shipment of rolled materials.

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FULL PORT *Self-Sealed* LUBRICATED PLUG VALVES

. . . the Lowest Priced, Full-Port-Area Plug Valves In Their Rated Working Class

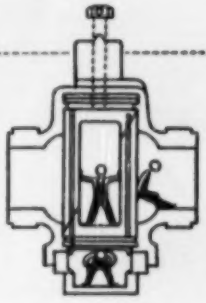
If you're using a venturi (restricted-port-area) valve with an opening of say, 60% standard pipe area, you are operating at reduced line pressure. To be sure of nearly full line pressure, you must use a larger size venturi, which of course means a higher priced valve . . . perhaps as much as 30% higher!

For example: **A 2½" Homestead-Reiser has a 100% full-port-area, or 4.78 sq. in. The 2½" size in 60% venturi pattern has only 2.87 sq. in. port area. To approximate the full-port-area of a 2½" Homestead-Reiser valve, a 3" venturi must be used. And even then you'll have less than Homestead-Reiser's full-port-area.**

In the light of this evidence doesn't it stand to reason that Homestead-Reisers with their 100% full-port-area are sound economy?

Truly, from the standpoint of both first cost and length of service, they are the lowest priced, full-port-area lubricated plug valves in their rated working class!

(← For complete information, write for Catalog 39, Section 5. We'll mail it to you promptly.



"SELF-SEALD" MEANS

. . . that in addition to a full-port lubricant seal the wedge-action of the plug under line pressure, forces the finished surfaces of the plug outward and constantly presses them against the seating surfaces of the body, thus keeping them always in intimate contact. The plug automatically adjusts itself for wear, assuring extra long life, maximum leakless service and lubricant economy.

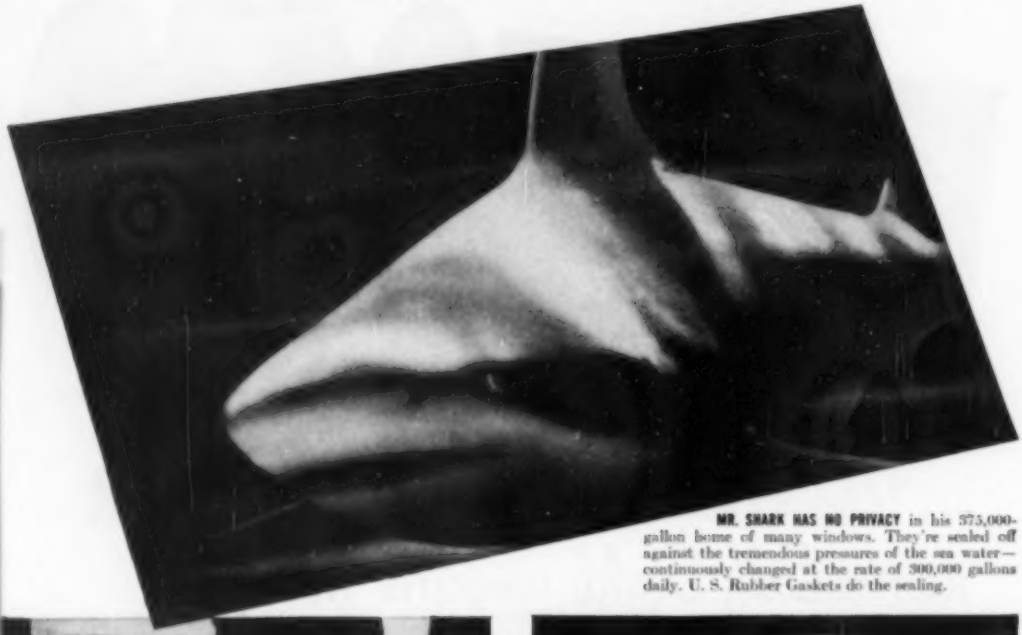
HOMESTEAD VALVE MANUFACTURING CO.

"Serving Since 1892"

P.O. Box 1, Coraopolis, Pa.

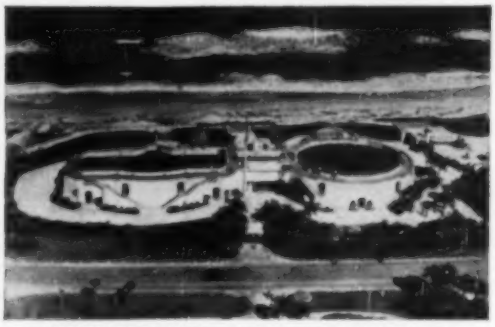
TRAPPED IN A GIANT FISH BOWL

Submarine Portholes in the "Deep Sea" Tanks at Florida's Marine Studios Kept Watertight with U. S. Rubber Gaskets



MR. SHARK HAS NO PRIVACY in his 375,000-gallon home of many windows. They're sealed off against the tremendous pressures of the sea water—continuously changed at the rate of 300,000 gallons daily. U. S. Rubber Gaskets do the sealing.

MORE THAN 200 PORTHOLES use U. S. Rubber Gaskets. A special rubber compound makes them corrosion resistant . . . completely watertight under abnormally high pressures . . . sufficiently pliable to fill any irregularities in the flange.



THE OVERALL PICTURE. Marine Studios at Marineland, Florida, represent one of many highly specialized operations where U. S. Packings are performing an outstanding job. For every field, there's a complete line of U. S. Packings.

Salt water, oil, acids, destructive chemicals at high temperatures . . . whatever your packing problem involves, you can count on U. S. Packings to solve it. And "U. S." Engineers are always ready to assist you in both planning and installation. Write to

A PRODUCT OF

U.S.RUBBER
SERVING THROUGH SCIENCE

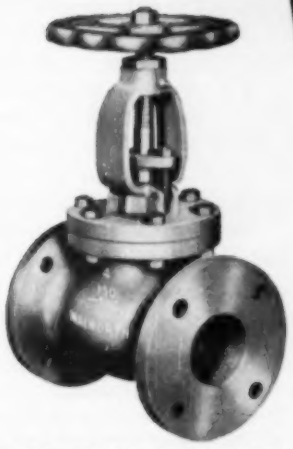
UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Newly Designed Walworth Valves to combat corrosion

Walworth 150-pound Stainless Steel Gate Valve . . . available in sizes ½ to 3-inch, screwed; ½ to 12-inch, flanged.

Made of Stainless Steel
Monel · Nickel
Acid-resisting Bronze
Ni-resist



Walworth 150-pound Stainless Steel Globe Valve . . . available in sizes ½ to 3-inch, screwed; ½ to 6-inch, flanged.

Sectional view of Walworth 300-pound Stainless Steel Gate Valve . . . available in sizes 2 to 6-inch, flanged.

— ENGINEERED AND TESTED FOR TOUGH . . . HARD SERVICE

Walworth offers a comprehensive line of valves made of several cast stainless steels and special alloys for piping services where corrosion is a factor. These valves are available in Gate, Globe, Angle, Check, and Lubricated Plug types.

Gate, Globe and Angle Valves have outside screw and yoke construction, thus keeping the stem threads out of contact with the corrosive material in the line. They also have a two-piece bolted gland with ball-type gland follower to prevent binding the stem when packing bolts are tightened. Gland eye-bolts can be conveniently swung out of the way without danger of loss when the gland is lifted for repacking.

Gate Valves have taper seats with a unit consisting of two flat faced discs supported by a carrier on the end of the stem. The discs are of a proven ball-and-socket type. They are free to rotate and adjust themselves to the body seat angles, assuring tight seating with no possibility of sticking in any position.

For further information about Walworth's full line of corrosion-resistant valves, see your Walworth distributor.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

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how McGRAW-HILL DIGEST (ABC) is helping nine U. S. firms cash in on the $675,000,000 chemical export market

Catch the eyes of the men who make or influence the buying decisions and you're close to the order. In export, the quickest, surest... and often the *only way*... to reach these men, is through the *right* business papers. The *right* business paper is one for which, year after year, executives pay money. McGraw-Hill Digest is such a publication. That's why these nine leading chemical manufacturers are using its pages to get their share of this year's estimated $675,000,000 chemical export market. Phone your McGraw-Hill Representative for information on how McGraw-Hill Digest can help you reach the eyes of the men who do the buying. Or write the McGraw-Hill International Corp., 330 West 42nd Street, New York 18, New York.

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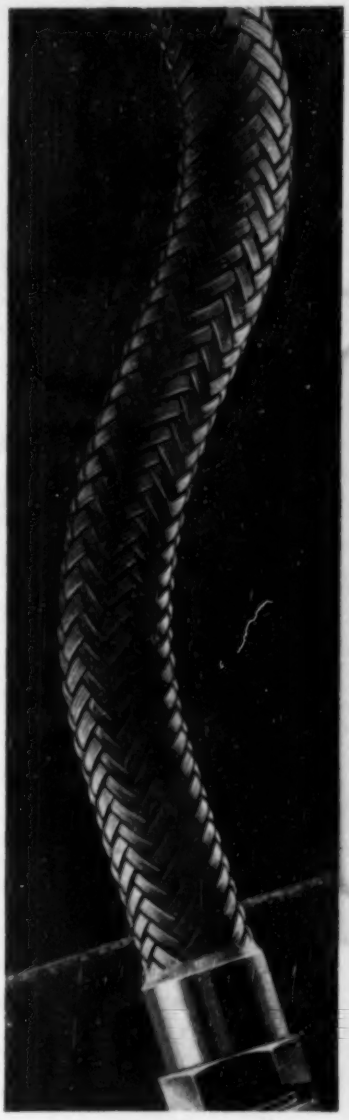
It's an "open and shut" case for flexible connectors

This tire re-capping machine opens and closes all day long. American Seamless Flexible Metal Tubing carries the hot steam in and out under pressure—safely, dependably, despite repeated flexing.

It's another example of how American Seamless Flexible Metal Tubing meets every requirement of the ideal flexible connector:

Seamless; leakproof
Pressure-resistant
Fatigue-resistant
Easy to connect

American Bronze Seamless Tubing carries steam to and from this automobile tire re-capping machine made by James C. Heintz & Company, Inc., Cleveland, O.



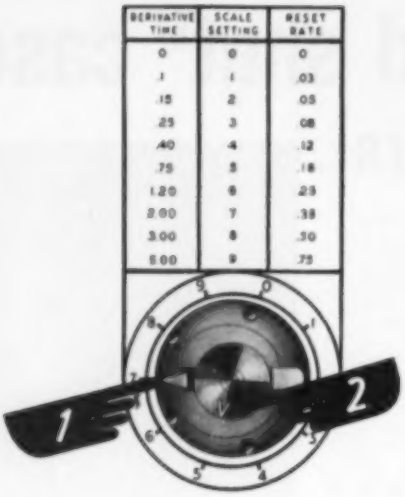
American Seamless Flexible Metal Tubing and American Flexible Metal Hose are made in a wide variety of styles and metals for conveying liquids, many chemicals, gases and semi-solids, under severe conditions of temperature, pressure and mechanical stress ... for protecting wiring and flexible driveshafts ... for connecting misaligned piping or ports.

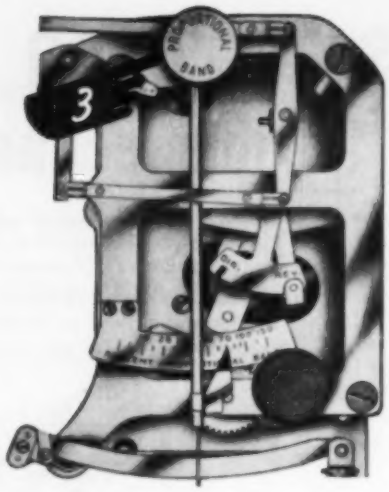
If your equipment requires movable connectors, let us send you the complete story on American Flexible Metal Hose and Tubing, or let our Technical Department make recommendations. Write to The American Brass Company, American Metal Hose Branch, Waterbury 20, Connecticut. In Canada, The Canadian Fairbanks-Morse Co., Ltd.

ANACONDA

wherever connectors must move ... American

FLEXIBLE METAL HOSE AND TUBING





if you use . . . or plan to use . . . automatic control instruments

you should investigate

these **THREE EXCLUSIVE ADVANTAGES** you get in

BRISTOL series 500 air-operated controllers

1. Reset Rate . . .
2. Derivative Time . . .
3. Proportional Band . . .

ADJUSTMENTS ARE ACCURATELY CALIBRATED AND EXACTLY REPRODUCIBLE

The reset scale is calibrated in actual reset rate. The proportional band scale is graduated in percent of proportional band. The derivative scale is calibrated directly in minutes.

This makes possible the exact duplication of controller adjustments for any process throughout a national organization.

It also makes possible the replacement of controllers on a process with full assurance that such replacements will exactly duplicate the performance of the original—eliminates the cut-and-try method of arriving at the original setting—saves hours by cutting down on shut-down time.

Accurate reproducibility is only one of the many advantages you get in Series 500 Air-Operated Controllers which exemplifies the outstanding instrument engineering Bristol puts into its complete new line of Series 500 recording and controlling instruments—products of over 60 years of instrument experience.

Write for new Bulletin A120 on Series 500 Air-Operated Controllers. THE BRISTOL COMPANY, 109 Bristol Road, Waterbury 20, Conn.

BRISTOL

Engineers process control for better products and profits

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

WITH Chapman STEEL VALVES

you get <u>both</u> production-line economy <u>and</u> the precision rating of custom-made valves

Because they're made with production line speed and economy, Chapman Steel Valves offer you important dollar savings. But you get more than just that — you get all the advantages of close quality-control from raw metal to final shipment to you.

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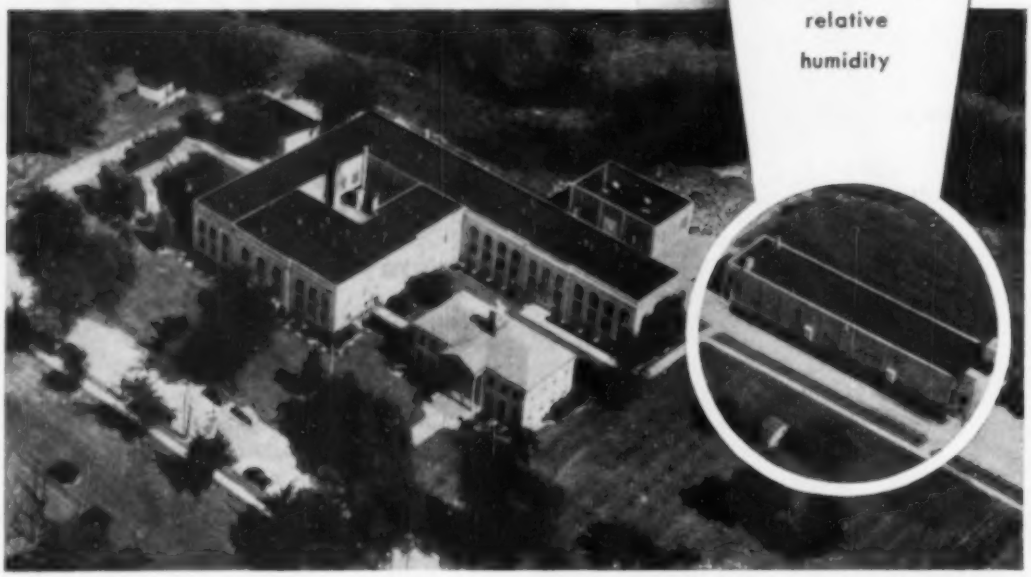
Why not write today for more information on these valves that offer you *both top quality and economy?*

The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASSACHUSETTS

The Institute of Paper Chemistry duplicates service conditions with all-weather humidity control

Container Laboratory can be maintained at 10% to 90% relative humidity



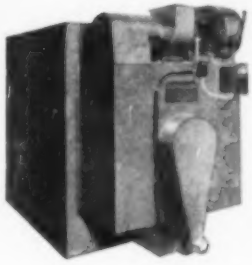
Research on paperboard and containers may require a moist atmosphere for one test and an extremely dry one for another. Two air-conditioned laboratories at The Institute of Paper Chemistry, Appleton, Wisconsin, provide such extremes. In one, relative humidities between 35% and 90% are maintained by refrigeration. Humidities as low as 10% are obtained in the other by a Lectrodryer.

Research here enables the Paper Industry to anticipate the hazards that paperboard and containers encounter in service. Thus, more economical, efficient and versatile products result.

Lectrodryers are assisting scientists similarly in every field—DRYing air, gases and organic liquids to low dew points. Laboratory Lectrodryers work in pilot plants to help standardize a process. Then there's a Lectrodryer of the type and size required to get production going.

Bulletin 216 tells you more about the use of Lectrodryers. For a copy, write Pittsburgh Lectrodryer Corporation, 303 32nd Street, Pittsburgh 30, Pennsylvania.

Air DRYing Lectrodryer



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REGISTERED TRADEMARK U.S. PAT. OFF.

High speed centrifuging cut crystal drying time . . . boosted savings

ANOTHER A.T.&M. SUCCESS STORY BY Sam Spinner
SAM, I'M USING BOTH CENTRIFUGING AND OVEN HEAT TO DRY CHEMICAL SALT CRYSTALS. OVEN DRYING TIME IS A BOTTLENECK THAT'S COSTING ME PLENTY – CAN YOU SPEED THINGS UP?
HMM... I THINK A NEW SET-UP WOULD SAVE YOU REAL MONEY HERE.
I'VE INSTALLED THIS NEW HIGH-SPEED CENTRIFUGAL. ITS FASTER BASKET SPEED REMOVES MORE OF THE MOISTURE FROM THE CRYSTALS, LEAVING VERY LITTLE FOR THE OVEN TO DO.
JUST LOAD THE CENTRIFUGAL, SPRAY THE CRYSTALS AND SPIN DRY. BUT THE OVEN'S JOB IS NOW SO SMALL IT CAN'T POSSIBLY HOLD UP THE JOB. YOU SHOULD MAKE REAL SAVINGS WITH THIS EQUIPMENT.
LATER
THIS WORKS FINE, SAM. THE NEW CENTRIFUGAL REDUCES CRYSTAL MOISTURE TO 1%. BEST THE OLD ONE COULD DO WAS 6%. THE OVEN CAN'T SLOW US UP NOW – I FIGURE WE'LL SAVE $30,000 THIS YEAR ALONE.
COST AND TIME-SAVING'S OUR BUSINESS AT A.T.&M. THAT'S WHY HIGH SPEED CENTRIFUGING IS TAKING OVER MORE CHEMICAL JOBS ... IT DOES 'EM FASTER BETTER, AT LESS COST.

SAVE TIME, SPACE AND COSTS WITH

A.T. and M. CENTRIFUGING

AMERICAN TOOL & MACHINE COMPANY
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Please send information on centrifuging applied to the following processes:
☐ Extraction ☐ Filtration ☐ Dehydration ☐ Coating ☐ Precipitation
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Write here any other process .....

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City ..... Zone ..... State .....

Let us know your set-up to date so we can advise modern centrifuging can do. JUST MAIL COUPON. NO OBLIGATION

Your industry asked for it. So here it is ...the first fully standardized, all-stainless steel shell and tube exchanger ... identical in design and dimensions to its cupreous counterpart, the world-famed "BCF" ... and like it, mass produced!

THE NEWS THAT BROKE JUST A FEW MONTHS AGO

. . . via this Ross ad in several business magazines. So great was the response that —

PRODUCTION HAD TO BE BOOSTED

. . . to keep current with orders. Result? Lower manufacturing costs — savings passed on to you.

SO, DOWN GO PRICES AS MUCH AS 22%

. . . on some sizes and from 10 to 22% on others.

$ $ SAVE $ $
Act now. If you haven't yet obtained information on the new Ross Type SSCF, do so at once by writing for Bulletin 1.7K1.

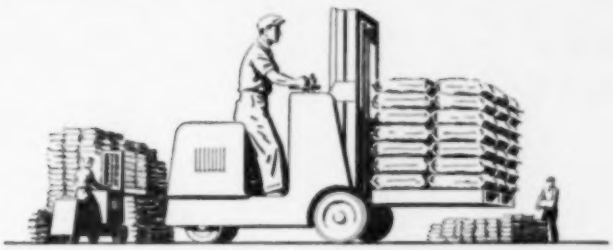
ROSS

FIRST WITH FULLY STANDARDIZED ALL-STAINLESS STEEL EXCHANGERS

ROSS HEATER & MFG. CO., INC., Division of American Radiator & Standard Sanitary Corporation 1411 West Ave., Buffalo 13, N. Y.

Serving home and industry

NOW! Stearic Acid of Laboratory Purity *in Commercial Quantities*



HYSTRENE* brings to the chemical industry a new concept of fatty acid purity . . . offers you a combination of features never before obtainable commercially.

Consider the opportunities for the development of superior products opened by these qualities:

1. Exceptionally low level of odor, color, and taste.
2. Unsaponifiable matter below 0.2%.
3. Iodine value below 0.5.
4. From vegetable or animal sources only.

HYSTRENE stearic acids in uniform grades ranging from 70% to 97% in true stearic acid content.

Here is a new series of saturated fatty acids of unusual chemical purity—true stearic acid content as high as 97% with virtually no unsaturated acids or unsaponifiables. Find out where this new standard of purity for stearic acid fits into *your* operations—write for full information today.

*Trade Mark

ATLAS CHEMMUNIQUÉ

Emulsifiers from Beeswax Make Soap-free Creams

Soap-free cold creams have been a tough problem for cosmetic technologists. But no more! Now Atlas is making new sorbitol-beeswax emulsifiers that produce stable cold creams, as well as all-purpose creams and hair dressings incorporating new effects. Ask for more info on G-1706 and G-1726, including typical cosmetic formulations.

Sorbitol Goes to Work Against Tooth Decay

Several of the new ammoniated and chlorophyll-based toothpastes depend on Atlas sorbitol as a moisture-conditioner, bodying and sweetening agent. Blending well with other ingredients, it gives a full-bodied paste that holds its consistency well in dry atmosphere when the cap is left off.

Cocoanut Stays Fresher Longer with Sorbitol

Manufacturers of shredded cocoanut have found that the Sorbo* grade of sorbitol keeps the nut meat in marketable condition longer. It has the added advantage of more pleasant flavor than other plasticizing agents.

*Reg. U. S. Pat. Off.

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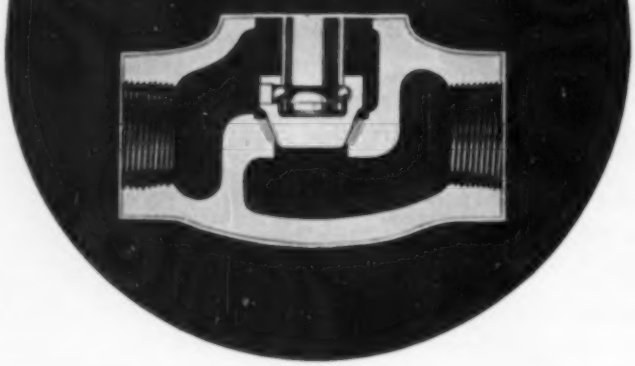
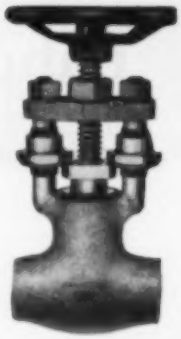


When you install **HANCOCK 600# WELDVALVES...**

Globe or Angle types—you are assured of freedom from valve seat leakage and replacement! For Hancock's integral stellite seats positively prevent leaks between body and seating surface, never need to be renewed! They guarantee valve service-life far beyond requirements of the equipment on which the valves are used.



HANCOCK WELDVALVES *give you these* **PLUS FEATURES!**

SUPERFINISHED "500 Brinell" stainless steel discs that eliminate wire drawing, steam cutting, erosion and corrosion.

•

POSITIVE BACK-SEATING by use of renewable polished stainless steel back-seating surfaces.

•

REAL STRENGTH in the upper structure—greater than in any conventional design.

•

CORROSION RESISTANCE of the exterior of the valve by special treating.

•

A STREAMLINED VALVE that allows close alignment of piping with near structures.

You can depend upon your Hancock Distributor for prompt service

MAXWELL MANNING MM&M TRADE MARK

HANCOCK *Valves*

1877 HANCOCK U.S.A.

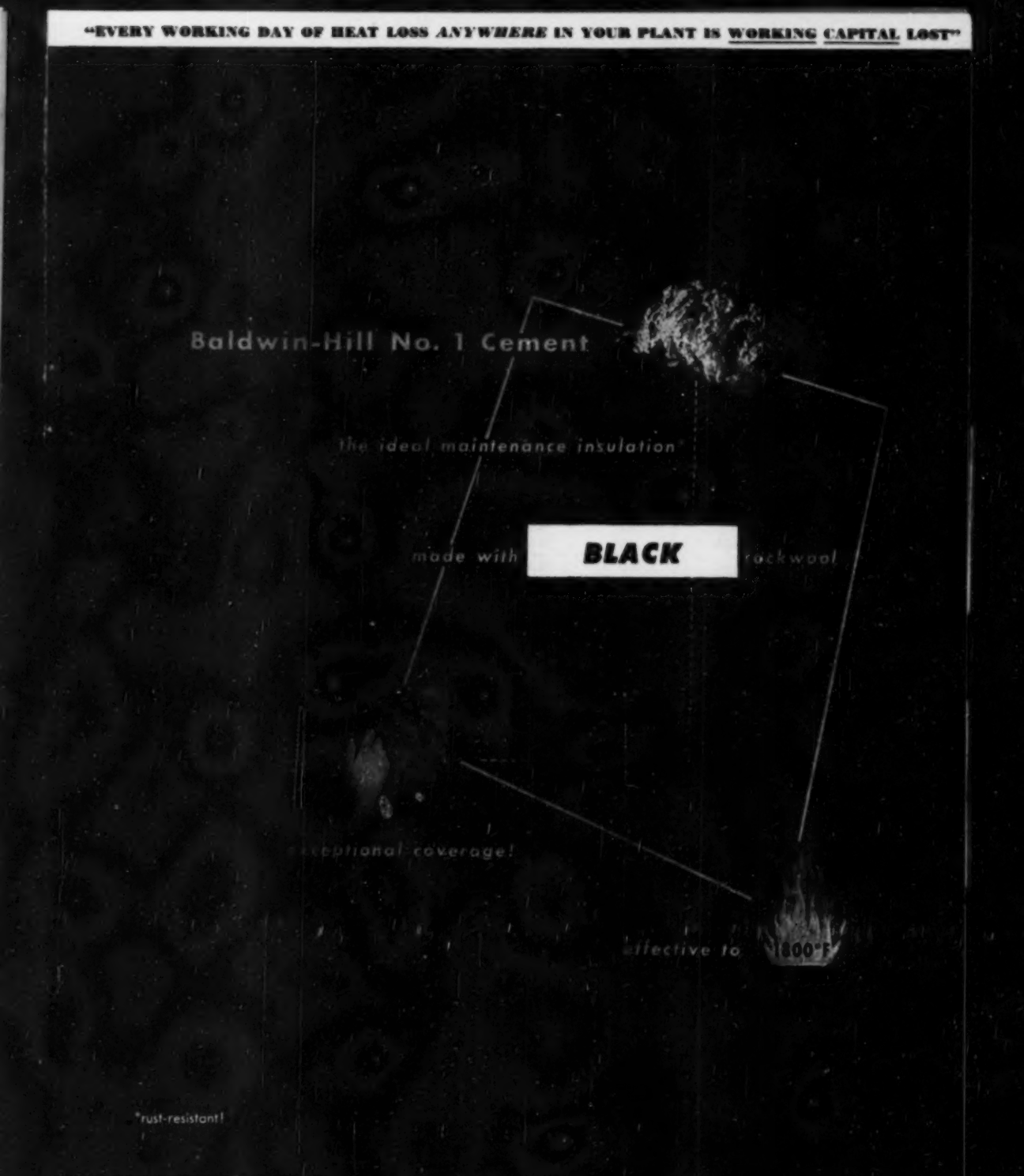
A PRODUCT OF

MANNING, MAXWELL & MOORE, INC.

WATERTOWN 72, MASSACHUSETTS

Makers of 'Hancock' Valves, 'Ashcroft' Gauges, 'Consolidated' Safety and Relief Valves, 'American' Industrial and 'Microsen' Electrical Instruments. Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load-Lifter' Hoists and other lifting specialties.

"EVERY WORKING DAY OF HEAT LOSS *ANYWHERE* IN YOUR PLANT IS WORKING CAPITAL LOST"



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GLOBE

Offers You a Wide Choice in Stainless Steel Tubes

GLOBE *Seamless* STAINLESS STEEL TUBES

GLOWELD *Welded* STAINLESS STEEL TUBES

AVAILABLE IN MORE THAN 26 ANALYSES

For Your Product or Process . . . One of These Types May Offer You the Most In . . .

- Resistance to Corrosion
- Strength at High Temperatures
- Resistance to Oxidation at High Temperatures
- Ease of Fabrication

TYPICAL ANALYSES (In Per Cents)

Type No.	Chromium	Nickel	Carbon	Other Elements
301	16-18	6- 8	Over .08-.20	
302	17-19	8-10	Over .08-.20	
302B	17-19	8-10	Over .08-.20	Si 2-3
304	18-20	8-11	.08 max.	
308	19-21	10-12	.08 max.	
309	22-24	12-15	.20 max.	
309S	22-26	12-15	.08 max.	
309Cb	22-24	12-15	.10 max.	Cb 8xC min.
310	24-26	19-22	.25 max.	
314	23-26	19-22	.25 max.	Si 1.5-3
316	16-18	11-14	.08 max.	Mo 2-3
316Cb	16-18	10-14	.08 max.	Mo 2-3; Cb 8xC min.
317	18-20	11-14	.08 max.	Mo 3-4
321	17-20	9-13	.08 max.	Ti 5xC min.
329	23-28	2.5-5	.20 max.	Mo 1-2
330	14-16	33-36	.15 max.	
347	17-20	9-13	.08 max.	Cb 10 x C min.
403	11.5-13		.15 max.	
405	11.5-13.5		.08 max.	Al .10-.30
410	11.5-13.5		.15 max.	
416	12-14		.15 max.	P, S, Se min. .07 Zr, Mo max. .60
430	14-18		.12 max.	
443	18-23		.20 max.	Cu .90-1.25
446	23-30		.20 max.	N .10-.25
Inconel*	11-13	70 min.		Fe 10 max.
Nichrome**	20	80		

*Registered U. S. Trade-Mark. **Trade-Mark Reg. U. S. Pat. Off.-D-H Co.

CHROMIUM, nickel, carbon, manganese, silicon, molybdenum, columbium, titanium — these and other elements, combined in various percentages, are the ingredients of stainless steel. Because varying analyses have widely varying service characteristics, Globe recommends a specific analysis or type only after carefully studying your particular problem. In addition to the above 26 standard types, *Globe also furnishes special analyses.*

You benefit from Globe's years of experience and research on stainless steel tubing problems. You are invited to take advantage of the extensive testing facilities in Globe's chemical, physical, and metallurgical laboratories and its staff of scientists and engineers.

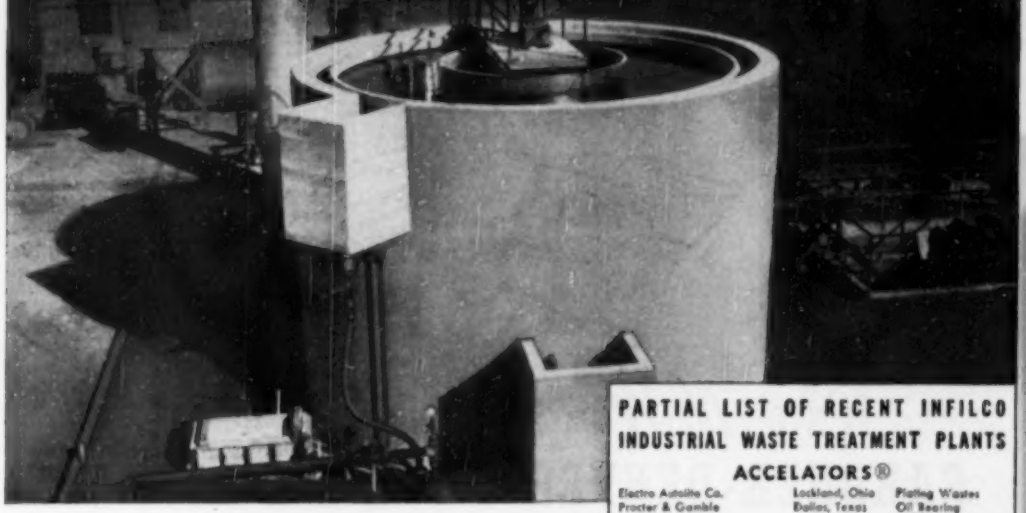
GLOBE STEEL TUBES CO., Milwaukee 4, Wisconsin

Write for Bulletin 501 — Corrosion and Heat Resisting Steel Analyses Chart — a valuable reference tabulation of stainless steel analyses as produced by various manufacturers.

Seamless Stainless Steel Tubes—Gloweld Welded Stainless Steel Tubes—Carbon-Alloy Seamless Steel Tubes — Globeiron Seamless High Purity Ingot Iron Tubes — Globe Welding Fittings

Controlled Slurry Recirculation

EFFECTIVELY TREATS OIL REFINERY WASTE WATER



THIS ACCELATOR® is chemically treating 500,000 GPD of waste water at Rock Island Refining Corporation, Zionsville, Indiana. Using lime and ferric sulfate as coagulants, the ACCELATOR consistently delivers an effluent containing only 5 PPM suspended solids and 8 PPM oil.

Here is another example of INFILCO'S equipment performance in the chemical treatment of industrial wastes . . using INFILCO knowledge gained through more than a half century of pioneering research and the manufacture of a complete line of water and waste treating equipment.

Take full advantage of the valuable service and unbiased recommendations of our competent engineering staff. They are prepared to help your engineers solve your waste treatment problems. Call our nearest field engineer or write us for complete information today. There is no obligation.

PARTIAL LIST OF RECENT INFILCO INDUSTRIAL WASTE TREATMENT PLANTS

ACCELATORS®

Electro Autolite Co.	Lockland, Ohio	Plating Wastes
Procter & Gamble	Dallas, Texas	Oil Bearing Condensate
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Magnolia Petroleum Co.	Fremont, Tex.	Refinery Wastes
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WORLD'S LEADING MANUFACTURERS OF WATER CONDITIONING AND WASTE TREATING EQUIPMENT

Don't Grease that Pump!

it's a *NEW* GARDNER-DENVER with pre-lubricated bearings

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Pre-lubricated ball bearings—now furnished with Gardner-Denver types B & C, BE & CE, CAX & CAE Centrifugal Pumps—never need greasing. They're factory lubricated with the proper kind and amount of grease, applied under the cleanest conditions known.

The grease is sealed in—FOR LIFE—all contaminating dirt is sealed out. Lubricant purchasing problems are eliminated. There's never any danger of overgreasing or undergreasing. And you save the time and grease consumed by periodic lubrication.

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American Blower—a time-honored name in air handling

In Los Angeles, as in other cities, American Blower Air Handling Products serve commerce, industry and public utilities. For air handling data in the Los Angeles area, call American Blower—Michigan 3871. Elsewhere, consult your phone book.

Look before you buy and you'll buy American Blower products. There's a big difference in quality, design, quietness, operating costs and efficiency. Test after test by buyers has proved the superiority of American Blower products.

Air is free . . . use it profitably!

MEN IN industry know the importance of air in process work and as a sure means of improving both working and selling conditions.

They know, too, the finest air handling equipment money can buy is, in the long run, their best investment.

Building better air handling equipment for America's commerce, industry and public utilities has been American Blower's business since 1881.

Out of the thousands of applications of American Blower drying, ventilating, dust collecting, air conditioning and air handling have come vital technical data and firsthand experience that you can profit by in your business.

If you would like to know how American Blower equipment can easily and profitably be applied to your plant, ask your Heating, Ventilating and Air Conditioning Contractor or phone the nearest American Blower branch office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
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AIR HANDLING EQUIPMENT

Serving home and industry

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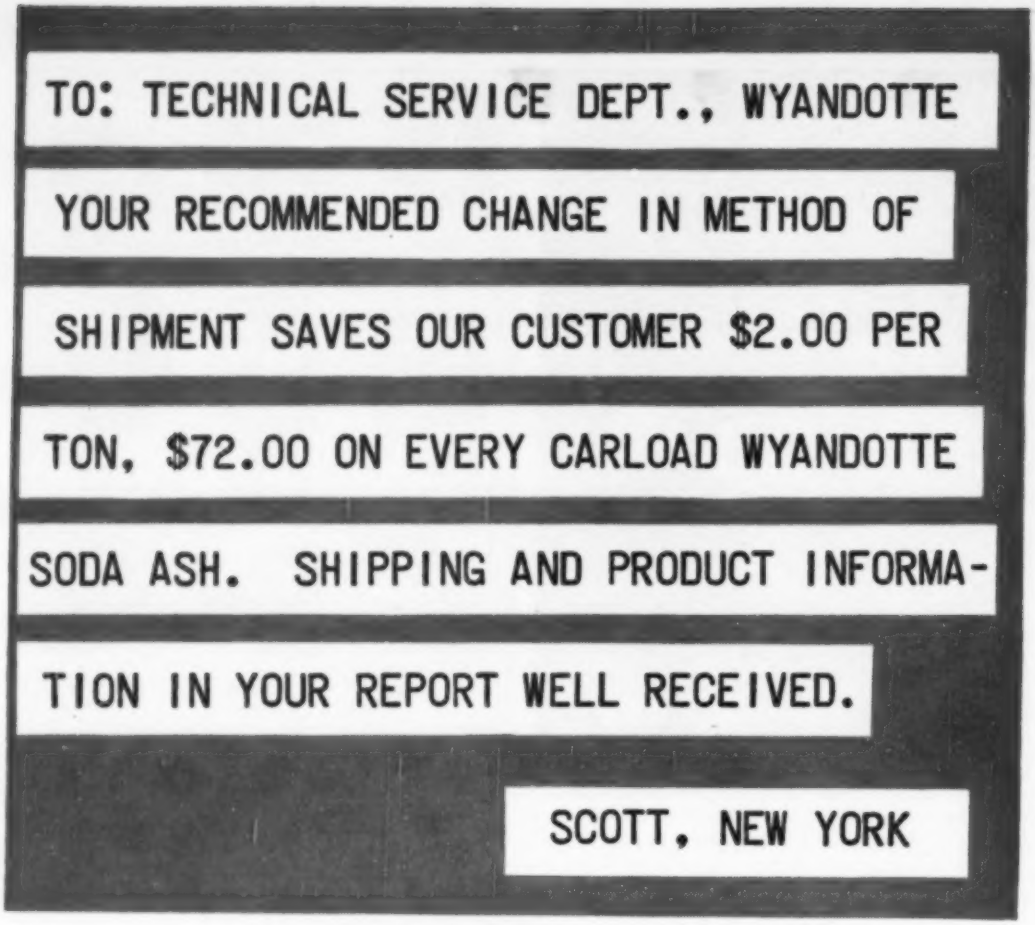
TO: TECHNICAL SERVICE DEPT., WYANDOTTE
YOUR RECOMMENDED CHANGE IN METHOD OF
SHIPMENT SAVES OUR CUSTOMER $2.00 PER
TON, $72.00 ON EVERY CARLOAD WYANDOTTE
SODA ASH. SHIPPING AND PRODUCT INFORMA-
TION IN YOUR REPORT WELL RECEIVED.
SCOTT, NEW YORK

Here is another example of Wyandotte Technical Service at work. In this case, the customer had been buying Soda Ash in bulk from box cars. The recommendation, based on a study of his unloading facilities and other factors, was that he switch to hopper cars. The results were a faster, cleaner unloading operation, plus a substantial saving in labor as well as material costs.

Wyandotte's skilled Technical Service staff stands ready to help you choose the proper grade of Wyandotte Soda Ash, the proper container for shipment and the best method of transportation — and to help you answer other related problems — based on your particular location, applications, storage and handling facilities.

For general product, shipping and other useful information concerning Wyandotte Soda Ash, just write:

Wyandotte Chemicals Corporation
Wyandotte, Mich. • Offices in Principal Cities

SODA ASH • CAUSTIC SODA
BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE
CHLORINE • HYDROGEN • DRY ICE
SYNTHETIC DETERGENTS • GLYCOLS
CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE
PROPYLENE DICHLORIDE
AROMATIC SULFONIC ACID DERIVATIVES
OTHER ORGANIC AND INORGANIC CHEMICALS

Wyandotte
REG. U. S. PAT. OFF.

No Stuffing Box Troubles–

BECAUSE THERE ARE NO STUFFING BOXES,

in

HAGAN

RING BALANCE METERS

The design of Hagan Ring Balance Meters eliminates stuffing boxes—and hence eliminates the troubles that go with them. Adjustment is less delicate, less maintenance is required; there is one less source of friction, hence greater sensitivity; there is no danger of leakage, therefore no way in which the fluid being measured can come in contact with any critical mechanism. No leakage means also that the meter stays in calibration over a much longer period.

Absence of stuffing boxes is, however, only one of the many important features of Hagan Ring Balance Flow Meters. They are rugged, sensitive, versatile—suitable for virtually every flow-metering application, including many applications which are almost impossible with conventional meters. For full information, write to Hagan Corporation, Hagan Building, Pittsburgh 30, Pennsylvania.

HAGAN CORPORATION

RING BALANCE FLOW AND PRESSURE INSTRUMENTS
THRUSTOR FORCE MEASURING DEVICES
BOILER COMBUSTION CONTROL SYSTEMS
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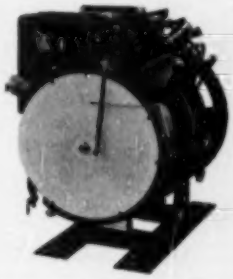
SOME TYPICAL

HAGAN

RING BALANCE METERS

Back view of single ring, high differential meter, showing S-tube connection.



Front view of dual meter with one high differential and one low differential ring.

Front view of three-pen meter in case. Panel space is the same for all models.

NEW PRODUCTS DATA SHEET

Subject: New products made from Carpenter Stainless No. 20, previously available only in cast form known as Durimet 20. The alloy's wrought forms, such as bars, strip and tubing developed by Carpenter, have resulted in many new and improved products such as those described here.

Outstanding Characteristics of "No. 20":

18-8

No. 20

Highly resistant to the corrosive effects of many acids and their fumes, *No. 20* has been found to increase equipment life from 2 to 20 times. Acids handled by *No. 20* include sulphuric, nitric, formic, acetic and many others, as well as corrodents such as copper sulphate, lead nitrate, sodium phosphate, etc. The part shown here is used in a process involving sulphuric acid.

Forms Available:

from Alloy Tube Division
The Carpenter Steel Co.
Union, N. J.

TUBING standard sizes and gauges from 3/16" through 2 3/16" O.D.

PIPE I.P.S. 1/4" through 2"

SHEET in these gauges: 24, 22, 20, 18, 16, 14 and 11

PLATE 3/16", 1/4", 3/8", 1/2", 5/8", 3/4" with heavier plate or forgings made to special order

from The Carpenter Steel Co.
Reading, Pa.

BARS all standard sizes and finishes, **WIRE** .050" Rd. and larger, **STRIP** (Cold Rolled) .010" and heavier in widths up to 8", **BILLETS** for reforging.

New Technical Bulletin Available

Information on No. 20's corrosion resistance, workability and mechanical properties is in this 18-page bulletin. To get a copy, write on your company letterhead and ask for the Carpenter Technical Bulletin on Stainless No. 20.

THE CARPENTER STEEL CO., ALLOY TUBE DIVISION, UNION, N. J.

OTHER PRODUCTS NOW BEING MADE from Carpenter Stainless No. 20

Names of the manufacturers of these products will be supplied upon request.

CASTINGS

CLAD PLATE

FASTENINGS

FITTINGS (screwed or flanged)

FORGINGS

HOSE (flexible)

PUMPS

WELDING ELECTRODES

WIRE—under .050" Rd.

WIRE CLOTH

VALVES

Many kinds of equipment such as heaters, coils, pickling tanks, fume ducts, etc. are made from Carpenter Stainless No. 20. Whatever your needs, we will try to put you in touch with the suppliers.

Carpenter

STAINLESS NO. 20

Licensed under patents of The Duriron Co., Inc.

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U.S.I. CHEMICAL NEWS

March ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1950

Canned Foods Improved By Use of Antibiotics

Lower canning costs and tastier canned foods may result from recent work on a new method using antibiotics in food preservation, according to a group of research scientists. In their tests, canned vegetables were sterilized by the addition of very small amounts of an antibiotic and then mild heat treatment of the sealed cans. The new procedure is said to have been as effective in destroying bacteria and other food-spoiling organisms as ordinary canning methods, which require more severe cooking.

Process Still Experimental

The process is still experimental, the scientists point out, and whether the antibiotics as used are toxic to man can only be determined after long and careful investigation. Tests made to date with the antibiotic "subtilin" are reported to indicate it has no ill effects on animal life. Compared with ordinary canning, the new method permits sterilizing the cans with heat faster, at lower temperatures, and without expensive pressure-cooking equipment. The antibiotics used reportedly do not affect the food's taste, and since only a mild heat treatment is needed the final products are described as having a better flavor than vegetables canned by conventional methods.

New Drug May Help Reduce Heart Fatality Rate

A new drug, claimed to be the best medicine yet developed for preventing blood clots which kill 200,000 Americans each year, may cut down heart attacks and save over 70,000 lives a year, according to a noted medical researcher. Tests indicate that the drug, "Tromexan," is better than any of the drugs now used against coronary thrombosis.

Tromexan goes to work within 24 hours and practically stops thinning the blood 24 hours later. This is an advantage, explained the researcher, since in some cases, for example in patients who also suffer from ulcers, blood cannot be thinned for too long without risking hemorrhages. Dicumarol, the leading weapon now in use against blood clotting, has the disadvantage of not going to work for two to four days and of continuing to thin the blood for four to five days or more. Heparin, which has also been used for blood thinning, is expensive to produce.

Bonds Aluminum to Steel To Prevent Corrosion

Bonding of aluminum to steel by a newly patented process is expected to find wide usage for protecting steel against corrosion. In the new method two strips of aluminum foil are applied to the top and bottom of steel sheet. A fine iron coating is first applied to the steel by an electrolytic process to provide a permanent bond between the two metallic surfaces. Older methods involving dipping steel in molten aluminum failed to produce a satisfactory bond. After the aluminum foil has been bonded to the steel by high-pressure rolling, the aluminum-covered steel can then be further rolled, it is reported, to reduce its thickness as desired.

U.S.I. Acquires Foreign Rights To 'Synthetic Pyrethrum' Patents

Issuance of Foreign Patents Will Permit U.S.I. to License Manufacturers Abroad to Produce New Pyrethrin-Like Chemicals

The acquisition by U. S. Industrial Chemicals, Inc., of important foreign rights under pending United States patents covering the synthesis and manufacture of pyrethrin-like chemicals was announced recently by Wm. P. Marsh, Jr., president.

Corresponding applications have been filed in all major foreign countries, including the United Kingdom, France, Australia, India, Brazil, Sweden, Pakistan, South Africa and many others, Mr. Marsh said.

In March of last year the insecticide world was electrified by the announcement of the U. S. Department of Agriculture that Milton S. Schechter and F. B. LaForge had successfully synthesized a group of chemicals closely corresponding to one of the important constituents of natural pyrethrum, and possessing many of the unique advantages of the natural product.

U. S. patents covering the invention were filed by the Department of Agriculture and

MORE

HE LOOKS TOUGH — and he is! The horse fly is one of the hardest to kill of the insects that attack dairy cattle. But dairy farmers can now control this and many other insects with *U.S.I. Pyronones—safe, effective insecticide ingredients containing pyrethrins and piperonyl butoxide.

* Reg. U.S. Pat. Off.

New Chart, Booklet On Transparent Films

A newly compiled chart, reported to present for the first time in easy-reference form the comparative characteristics of commonly-used transparent films, is being offered to film users by a well known adhesives manufacturer. Films in general use have been set up in the chart in 14 groups, it is stated, according to basic chemical composition. In addition to identification by their physical or chemical reactions and by their manufacturers, the films are further described as to their respective trade names, their gauge or thickness, commercial types according to the manufacturer's code description as well as their characteristics in actual use. More than 38 different trade names of transparent films are listed; names and addresses of the manufacturers of these products are also given. Supplementing the chart is a pocket-size booklet on how to handle adhesives for transparent films. This booklet discusses further details about general types of adhesive formulations for bonding transparent films, proper handling methods, and some of the problems encountered in obtaining good adhesion.

Natural Rubber Improves Durability of Leather

By impregnating leather with natural rubber scientists report they have been able to increase abrasion- and water-resistance so that sub-standard leather, such as "belly-cuts" from steer hides, may be used commercially. Preliminary service testing of rubber-treated soles indicates a definite improvement in wear over untreated leather soles. Investigations are now under way on the use of synthetic rubber and other materials for leather treating.

New Synthetic Mica Superior to Natural

Synthetic mica said to have essentially the same properties as natural mica but to be superior to it in ability to withstand high temperature has reportedly been produced. The new synthetic product is made from quartz, agnesite, bauxite, and a fluorosilicate which acts as a crystallizing agent and imparts to the material its superior heat resistance.

New High-Vacuum Drier

A new, continuous, high-vacuum belt drier, said to be economical for drying such materials as penicillin, amino acids, milk, and coffee, has been developed. Used to produce a soluble "instant" coffee the new drier has yielded material that is of low density, porous and instantly soluble.

Advantages claimed for the new unit are that the drier area is always producing and that it has a relatively high capacity. Heat input can be controlled, it is reported, along the belt to maintain a temperature gradient, which is important in attaining maximum production. One man can operate a large unit, so labor cost is low. Controlling concentration of solution to be dried and amount sprayed on a unit area of belt is said to make possible the production of almost any desired density of material.

ADVERTISEMENT—*This entire page is a paid advertisement* *Printed in U. S. A.*

March ★ **U.S.I. CHEMICAL NEWS** ★ 1950

CONTINUED

'Synthetic Pyrethrum'

it was announced that these patents would be held in the public interest for unrestricted use in this country. The prosecution of foreign patents, however, was waived to the inventors as individuals, subject only to certain rights reserved by the federal government, and U. S. Industrial Chemicals acquired these foreign rights from Mr. Schechter and Dr. LaForge for an undisclosed sum.

The chemicals are destined for use in insecticides, which long have effectively utilized natural pyrethrins, obtained from the pyrethrum flower. Pyrethrum, while recognized as a uniquely valuable insecticide, has always been limited in supply and inherently expensive to raise, and the problem of synthesizing the material had defied chemists until 1949.

Spotted cucumber beetles on the blossom of a cucumber plant. These and a wide variety of other truck crop insects are controlled by dusts and sprays based on U.S.I.'s CPR — an insecticide concentrate containing pyrethrins, piperonyl cyclonene, and rotenone.

Issuance of the foreign patents will enable U.S.I. to license qualified manufacturers abroad to produce these chemicals according to manufacturing specifications provided by the corporation. It was pointed out that foreign production of the chemicals will necessarily depend on development of adequate markets and the availability of raw materials.

In this country developments have been rapid and U. S. Industrial Chemicals, one of several concerns carrying on work on the synthesis, recently announced the imminent availability of one of the Schechter-LaForge group of chemicals which almost exactly duplicates Cinerin I, one of the active principles of pyrethrum. Its availability supplements the present limited supplies of natural pyrethrum, and facilitates the current rapid expansion in the use of pyrethrum-type insecticides, although the synthetic compound cannot be regarded as a substitute for natural pyrethrum for many uses. Most of the natural pyrethrum is now imported from Africa.

The company now uses a large proportion of the world's supply of pyrethrum in combination with piperonyl butoxide and piperonyl cyclonene and other chemicals in the production of insecticide materials that have been demonstrated to be highly effective as well as free from any toxicological hazards.

New Guide for Preparing Warning Labels Is Offered

A revised edition of the manual, "Warning Labels," originally published in 1945, is available now from a noted chemical association. Arranged in convenient 6"x9" size, loose leaf, the 86-page manual is intended as a guide for the preparation of warning labels for hazardous chemicals. It is divided into three parts: general principles involved in the design and preparation of warning labels for hazardous chemicals; 180 illustrative warning labels for industrial chemicals; 58 illustrative warning labels for economic poisons. The book has a table outlining statements of hazard, precautionary measures and instructions in case of contact or exposure, based on class of hazard encountered.

Analyze 'APC' Without Separating Components

A new method involving infra-red analysis is claimed to make possible simultaneous determination of aspirin, phenacetin, and caffeine without separation of the components. The procedure is accurate to within a range of ±2% and can be completed in about four hours, according to the scientists who developed it.

TECHNICAL DEVELOPMENTS

Further information regarding the manufacturers of these items may be obtained by writing U.S.I.

A new "water-hating" (hydrophobic) starch product, claimed to have broad commercial possibilities for use as a flatting agent in lacquers, detackifying agent for rubber articles, lubricating agent, etc., is a finely divided powder so free-flowing that it behaves in many ways like a liquid. **(No. 549)**

A wall-covering material with a fabric pattern that looks like a textured surface but is actually hard and smooth to the touch has been developed, it is reported. Application is by adhesives or mechanical fastenings and it can be worked with ordinary tools, the makers assert. **(No. 550)**

A new, improved crack-sealer for factory, home, and farm use in sealing windows, baseboards, holes, etc. against cold, dust, dirt, and insects, is applied simply by pressing into place by hand, according to the manufacturers. It can be applied, removed for window cleaning, and re-applied again and again, it is claimed. **(No. 551)**

A new "anti-itch" drug reportedly offers relief from severe itching. **(No. 552)**

A new-type extension spray gun for industrial maintenance painting, capable of reaching to second-story levels, is claimed to be light in weight and to accommodate any sprayable fluid from light paints to heavy asphaltic compounds. **(No. 553)**

A low-pressure aerosol for applying aluminum paint, suitable for spraying radiators, pipes, furnaces, and other metal, wood, or stone surfaces is on the market. One can covers 75-100 sq. ft., depending upon the surface, the makers claim. **(No. 554)**

A new agricultural fungicide, described as exceptionally effective against a wide variety of fungus diseases attacking fruits, vegetable crops, and certain plants, is reported available as a white odorless, tasteless powder. **(No. 555)**

A microscope the size of a fountain pen, said to have relatively high-power magnification—up to 60 power—is described as being a precision-built instrument that is light in weight, ruggedly constructed, and self-illuminating. **(No. 556)**

A dual purpose lacquer for use on both cellulose acetate and cellulose acetatebutyrate plastics is reported to be available in a clear finish or in colors, and to air dry in a few minutes. **(No. 557)**

A new-type "metallic-finish" upholstery material is described as resistant to aging, weathering, and sun exposure. **(No. 558)**

PRODUCTS OF U.S.I.

ALCOHOLS
Amyl Alcohol (Isoamyl Alcohol)
Butanol (Normal-Butyl Alcohol)
Fusel Oil—Refined
Propanol (Normal-Propyl Alcohol)
Ethanol (Ethyl Alcohol)
Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof U.S.P., Absolute—200 Proof
Solox*—proprietary solvent—regular and anhydrous
ANTI-FREEZES
Super Pyro* Anti-Freeze
U.S.I. Permanent Anti-Freeze
AMBOLS
Ansol* M
Ansol* PR
ACETIC ESTERS
Amyl Acetate—Commercial and High Test
Butyl Acetate
Ethyl Acetate—all grades
Normal-Propyl Acetate
OXALIC ESTERS
Dibutyl Oxalate
Diethyl Oxalate
PHTHALIC ESTERS
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate
Dioctyl Phthalate
OTHER ESTERS
Diethyl Carbonate
Ethyl Chloroformate
INTERMEDIATES
Acetoacetanilide
Acetoacet-ortho-chloroanilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloroanilide
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Sodium Oxalacetate
ETHERS
Ethyl Ether, U.S.P.
Ethyl Ether, Absolute—A.C.S.
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FEED PRODUCTS
Choline Concentrates
Curbay B-O*
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Riboflavin Concentrates
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Vacatone* 40
RESINS (Synthetic and Natural)
Arachem*—modified types
Arofene*—pure phenolics
Arofluf—for special flat finishes
Aroplaz*—alkyds and allied materials
Congo Gums—raw, fused & esterified
Ester Gums—all types
Natural Resins—all standard grades
INSECTICIDE MATERIALS
CPR Concentrates: Liquid & Dust
Piperonyl Butoxide
Piperonyl Cyclonene
Pyrenone* Concentrates: Liquid & Dust
Pyrethrum Products: Liquid & Dust
Rotenone Products: Liquid & Dust
INSECTIFUGE MATERIALS
Indalone*
Triple-Mix Repellents
OTHER PRODUCTS
Colladions
Ethylene
Nitrocellulose Solutions
PB*—Liquid Insulation
Urethan, U.S.P.
Special Chemicals and Solvents

*Reg. U.S. Pat. Off.

U.S.I INDUSTRIAL CHEMICALS, INC.

60 EAST 42ND ST., NEW YORK 17, N. Y. U.S.I. BRANCHES IN ALL PRINCIPAL CITIES

IF YOU GET OFF TO THE RIGHT START IT'S EASIER

Transform this square into five small squares, all equal to one another, whose total area shall be equal to this square. Par for this puzzle is 10 minutes. LOOK FOR THE SOLUTION WHICH WILL APPEAR NEXT MONTH.

TO SOLVE THIS PUZZLE...

or your drying problem...

There is an amazing similarity between a simple thing like solving this puzzle . . . and a much more complex matter like solving your drying problem. In both instances—the solution is reached with greater ease—if you get off to the right start.

Getting off to the right start in the solution of your drying problem means calling in Proctor engineers the moment you realize that drying equipment is to be a part of your processing line. In fact, it may even start with a long distance telephone conversation in which you can iron out the answers to certain fundamental questions which may save hours of your engineers' time.

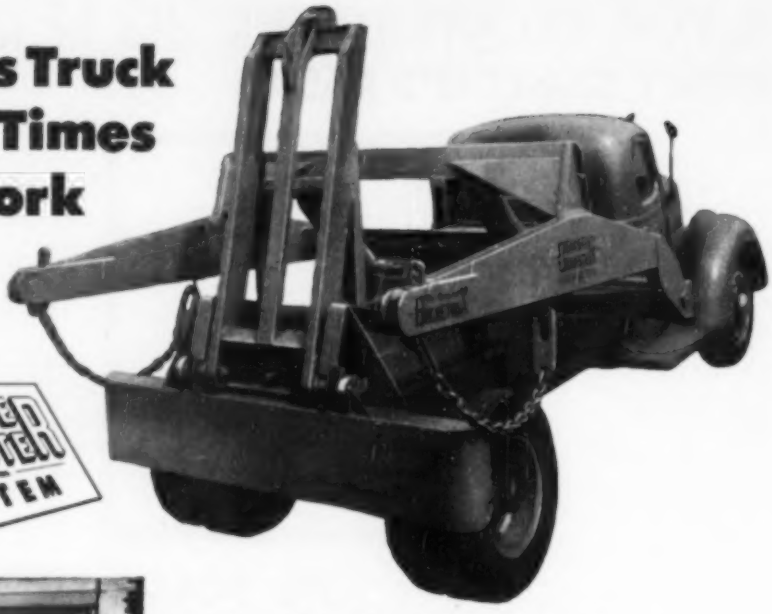
First of all—early consideration of drying equipment is important, for that equipment may well have an important bearing on the preliminary and subsequent processing. Because of this, it pays in dollars and cents to know something about the basic type of drying system that you are planning to use at the time you consider each of the other steps in the process.

Countless hours of laboratory work on the part of your technicians may be saved by consulting Proctor engineers early. Honestly, Proctor engineers are more interested in helping you solve your problems . . . more concerned with saving you money and effort than with merely selling equipment. The facilities of Proctor research laboratories are available to you *without cost or obligation.* Those who have availed themselves of these facilities have found that it has always worked out to their advantage. If you have a drying problem—remember getting off to the right start will help speed the solution . . . and the right start includes early discussion of that problem with Proctor engineers. Call or write today.

PROCTOR & SCHWARTZ INC. • 711 TABOR ROAD • PHILADELPHIA 20, PA.

Now This Truck Does 10 Times More Work

In The DEMPSTER DUMPSTER SYSTEM



Picks-Up, Hauls, Dumps Four Railroad Cars of Materials Daily!

Before the Dempster-Dumpster Hoisting Unit was installed on the above truck chassis, it was one of 10 conventional trucks being loaded by hand. Now, the truck hoisting unit has replaced all 10 trucks. In many plants handling materials by the Dempster-Dumpster System, one Truck Hoisting Unit has replaced from 5 to 10 conventional trucks. In each plant a single hoisting unit handles many containers. In one particular installation, one unit serves 37 detachable containers of various types and sizes, ranging from 2½ to 8 cu. yds. This plant produces, daily, approximately 220 cu. yds. (about 4 car loads) of materials of every description, including rubbish, scrap and finished product. This daily output is handled in only eight hours by the Dempster-Dumpster equipment. Containers are spotted at materials' accumulation points throughout the plant. When each container is filled, it is picked up by the truck hoisting unit, carried to the point of disposal, set down intact or dumped and returned for refilling. The entire operation is hydraulically controlled and handled by only one man, the driver. This modern system is eliminating much equipment investment in industrial plants. It is cutting maintenance costs, tire and gas requirements. But, most important, it increases production with a minimum of manpower. Don't assume that your problem is different—that the Dempster-Dumpster System of materials handling is not applicable to your problem. Such cases have happened, only to discover later that this equipment was exactly the type needed. Our most difficult job in our advertising is to make the wide use . . . the flexibility and simplicity of the Dempster-Dumpster operation clear to the reader. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

Pictured at left is a standard drop bottom type container in three stages of operation—on the ground, in carrying position, and dumping.

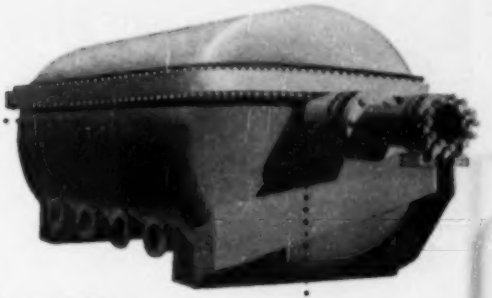
DEMPSTER BROTHERS

230 Dempster Bldg. Knoxville 17, Tenn.

ONE OF A SERIES DEMONSTRATING APPLIED LUKENOMICS

NEW BROOM FOR PROCESS LIQUORS... or increasing

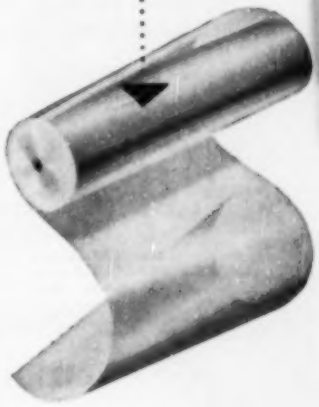
raw material recovery through modern pressure filtration



A well-known manufacturer of plastic film is reducing operating and maintenance costs and achieving increased recovery of valuable raw materials through pre-filtering. A "closed operation," rotating leaf, pressure filter with a stainless-clad steel body for protection against corrosive solutes, catalysis, and metallic pickup is used. The unit assures maximum recovery of expensive process chemicals, permits effective insulation at the operating temperature, and eliminates escape of fumes.

Such operating benefits result quite naturally whenever Lukenomics is put to work. Lukenomics is the engineering art of solving the *total* problem posed in considering new equipment . . . not design alone, nor materials, nor fabrication . . . not product quality, nor operating cost, nor amortization . . . but all of these, and more, as they affect process, product, sales, profits. Lukenomics brings to bear not only Lukens own products, services and knowledge of materials but marshals, as well, the highly specialized skills and services of industry's most experienced engineers and equipment manufacturers.

To obtain the advantages of equipment made by fabricators applying the Lukenomics principle, write our Manager of Marketing Service, Lukens Steel Company, 400 Lukens Building, Coatesville, Pennsylvania.

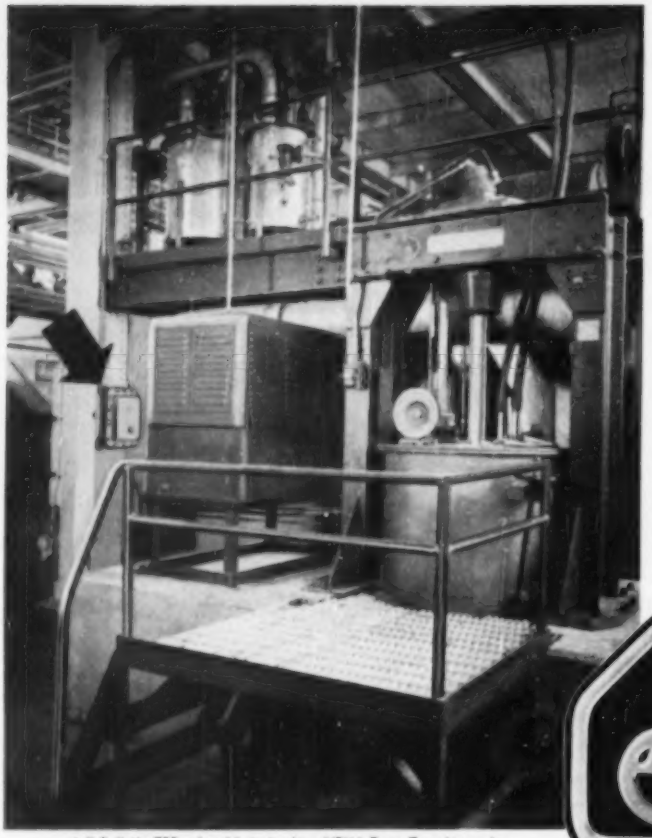


Goslin-Birmingham Manufacturing Co., Inc., Birmingham, Alabama, fabricates Valles Rotating Leaf Pressure Filters for the chemical, paper, petroleum and allied industries, using Lukens Clad Steels—Nickel-Clad, Stainless-Clad, Inconel-Clad and Monel-Clad—whichever corrosive service conditions warrant.

LUKENS

LUKENS STEEL COMPANY

BETTER PRODUCTS FOR BETTER EQUIPMENT



A-B Bulletin 709 solenoid starter in a NEMA Type 7 enclosure in the plant of the American Machine and Metals Company in East Moline, Illinois.

FOR EXPLOSIVE ATMOSPHERES

Select TROUBLE FREE A-B STARTERS in SAFE ENCLOSURES

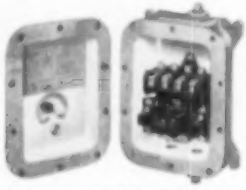
In explosive atmospheres, install A-B motor controls in NEMA Type 7 enclosures. Constructed of cast iron with wide machined flanges, these bolted enclosures provide maximum protection. Allen-Bradley solenoid starters are ideal for bolted enclosures . . . their double break, silver alloy contacts need no maintenance, hence cover need not be taken off for frequent contact inspection.

Allen-Bradley has a safe enclosure for every kind of job . . . wet, hazardous, dusty, corrosive. Write for information.

Allen-Bradley Co.
1337 S. First St. Milwaukee 4, Wis.

A-B Quality

In Hazardous Locations Protect Men and Equipment with NEMA Type 7 Enclosures



Inside view of Bulletin 709 solenoid starter in a NEMA Type 7 enclosure. Air break contacts. Wide machined flanges. Cast iron enclosures. Gray enamel finish. White interior.

View of Bulletin 709 in NEMA Type 7 Enclosure.

Only A-B offers you ALL these advantages in a motor starter

- Simple construction—Only ONE moving part
- Double break, silver alloy contacts need no maintenance
- Millions of trouble free operations
- Dependable relays provide accurate overload protection
- Thermal breakers are quickly reset by pressing the STOP button
- No voltage protection
- White interiors and ample space for ease of wiring
- A safe enclosure for every kind of job

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

ANTI-CORROSIVE and VACUUM SEALED

The SIMPSON *Mix-Muller*®

MORE THAN *Just a Mixer!*

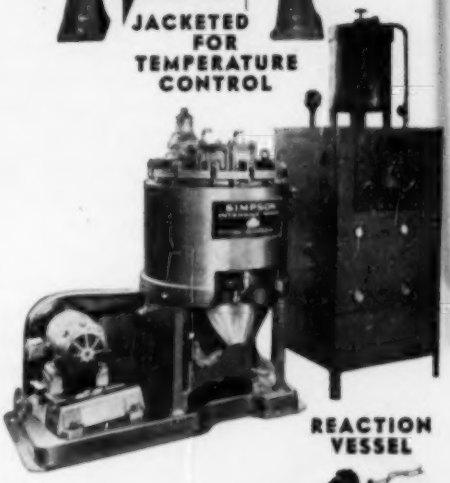
JACKETED FOR TEMPERATURE CONTROL

You probably know that Simpson *Mix-Mullers* are primarily designed to do an excellent *mixing* job . . . that their mulling action quickly develops maximum plasticity in the mix . . . with a strictly uniform product resulting.

But there is more to a Simpson than that. Whether it be used for laboratory or production work that calls for a reaction vessel . . . for mixing materials where special jackets for temperature control are required . . . for mixing materials that demand corrosion-resistant mixer construction . . . or for mixing under a vacuum . . . Simpson *Mix-Mullers* can be specially equipped to do the job . . . and do it well. All of these various phases of mixing jobs are handled with equal efficiency.

So for any processing job involving the mixing of dry, plastic or semi-plastic materials that you want done faster, better and at lower cost, consult a National Engineer. His service is yours for the asking. If you prefer, our laboratory facilities are available to determine the mixing ability of Simpson *Mix-Mullers* to handle your specific problem.

For details, send for a copy of our latest 8-page Chemical-Process Mixing Catalog.

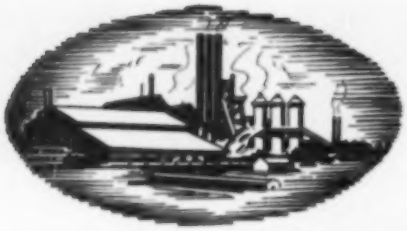


REACTION VESSEL

SIMPSON *Mix-Muller*® Division

NATIONAL ENGINEERING CO., 604 Machinery Hall Bldg., Chicago 6, Ill.

Manufacturers and Selling Agents for Continental European Countries—George Fischer Limited, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd., Sydney, Australia.



1900 ★ THE MIRACLE OF AMERICA ★ 1950

Freedom and Progress

It's no stretch of the imagination, rather, robust realism to call our past half century a Miracle—U. S. A.

America has set an amazing record of progress in 50 years—but a moment in the history of civilization. A record unequalled by any other political or economic system.

Merely by broad brush strokes, we can all visualize this miracle. Remember the crystal set, the hand-cranked car, the biplane? A far cry from our FM radio, television, hydro-matic drive and supersonic planes.

And here's another phase of the miracle that went hand-in-hand with these and the myriad of intertwined technological advances—ranging from the radio telephone and Bakelite to the X-ray tube and teletype . . . and to atomic energy and its untold potentialities.

- ★ Since 1900 we have increased our supply of machine power 4½ times.
- ★ Since 1900 we have more than doubled the output each of us produces for every hour we work.
- ★ Since 1900 we have increased our annual income from less than $2400 per household to about $4000 (in dollars of the same purchasing power), yet . . .
- ★ Since 1900 we have cut 18 hours from our average work week—equivalent to two present average workdays.

How did we do it? The basic cause for this composite miracle has been the release of human energy through FREEDOM, COMPETITION and OPPORTUNITY. And one of the most important results is the fact that more people are able to enjoy the products of this free energy than in any other system the world has ever known.

THIS IS THE MIRACLE OF AMERICA . . . it's only beginning to unfold.

Published in the public interest by:

McGRAW-HILL PUBLICATIONS

"Buffalo" Taking the DUST Out of Industry!

- FOR HIGHER PRODUCTION
- FOR QUALITY CONTROL
- FOR IMPROVED WORKING CONDITIONS

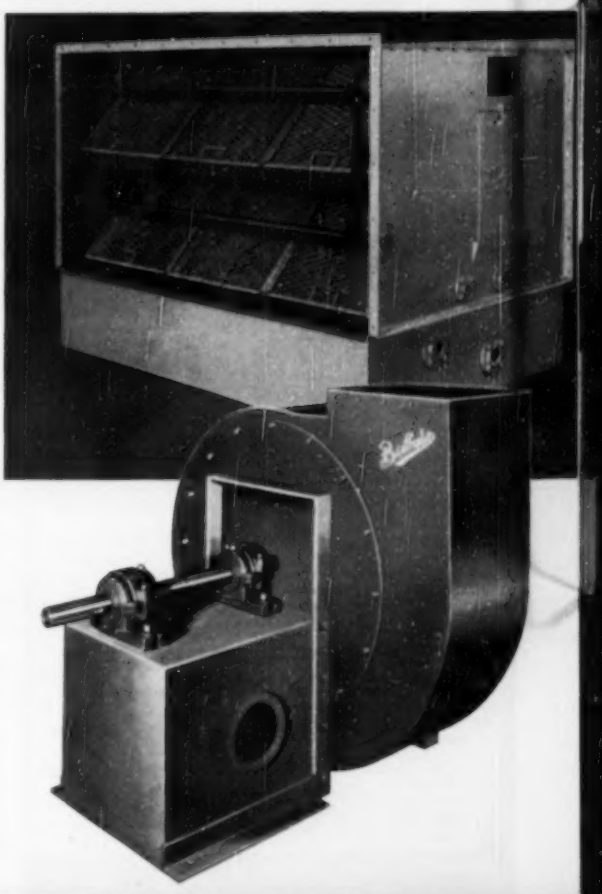
CLEAN PLANT AIR is a definite asset to your business. Not only does it help your public relations, but it is a big factor in your profit picture. And "Buffalo" has the equipment you need to do this cleaning-for-profit job . . . economically . . . and to the specifications you desire.

"BUFFALO" AIR WASHERS

Where your dust content must be held relatively low, "Buffalo" Air Washers can do this job continuously with very low-cost maintenance. For removing over 98% of visible particles, specify "Buffalo" Wet Glass Cell Air Washers, as shown at right. Both types give you humidity control. "Buffalo" Static Washers, still another type, do valuable work in salvaging by-products. WRITE FOR BULLETINS 3142-C and 3447.

"BUFFALO" INDUSTRIAL EXHAUSTERS

The low-cost answer to many a dust control problem, these exhausters have a reputation for requiring little maintenance and lasting long on the job. Sturdy, efficient all-welded design for continuous exhausting or conveying work.



BUFFALO FORGE COMPANY

501 BROADWAY BUFFALO N Y

Canadian Blower & Forge Co. Ltd. Kitchener, Ont.

Branch Offices in all Principal Cities

P-S Materials HANDLING EQUIPMENT

CUSTOM BUILT TO MEET YOUR NEEDS

BARREL and BOX SKID All-Steel

Item B-470

All steel—welded construction—light weight. Will stand up under the heaviest barrel or box. Skid measures 14" wide overall.

Combination TRUCK and DRAIN RACK

Loads Automatically

A dual purpose truck that can be used to move barrels or drums and also serve as a drain rack. Available in two styles—with or without detachable handles. Sturdy frame-welded construction. Weight approximately 90 lbs.

Item NS-506 (Handles welded to frame) $42.50

Item NS-506 DH (truck complete with detachable handles) $44.50

Vertical DRUM LIFTER

For handling open and closed steel drums in vertical position, by crane or hoist. All-steel, with heavily welded chain. Sure-hold safety barrel grip. Saves plant space. Use for either high or low ceiling condition.

Item C-465 $27.50 FOB DETROIT

DRUM and BARREL TILT

Item B-731 $165.00

A barrel tilt for controlled, precision dumping or pouring. Ideal for chemicals, solvents, powders, etc. Turns 360° through worm drive. Equipped with two safety type locking devices and all-steel, welded yoke. Hand-operated chain drive.

BARREL TRUCK

It Loads Automatically. Three style wheels: metal, rubber or metal and pneumatic. Capacity 1000 lbs. 22" wide for narrow openings. Weight 85 lbs.

When Ordering give item number. Prices subject to change without notice.

Item S-911P Pneumatic Rubber Wheels $45.00

Item S-911M Metal Wheels $33.50

Item S-911R Molded on Rubber Wheels $38.50

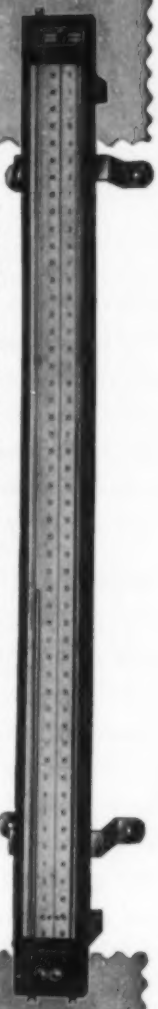
DESIGNED AND MANUFACTURED BY

Palmer-Shile Co.

16037 FULLERTON AVENUE • DETROIT 27, MICH.

Announcing the DUAL-TUBE

Something Brand New in MANOMETERS by MERIAM



• Now, instead of standing on a step ladder—as when reading long range, single column manometers—the operator can read high range pressures, vacuums, and differentials from the floor level.

This new manometer development—the DUAL-TUBE, Meriam Model M-100 — consists of two separate manometer tubes in the same case—each tube with individual well. The left tube has a scale increasing upward; the right tube a scale increasing downward. Both tubes are connected in parallel to the same pressure source.

The instrument is ideal as a calibrating standard manometer for checking flow meters, pressure gauges, and other secondary units operating on pressure or vacuum principle. It is direct reading. Since both tubes indicate the same reading, the operator can choose the one most convenient.

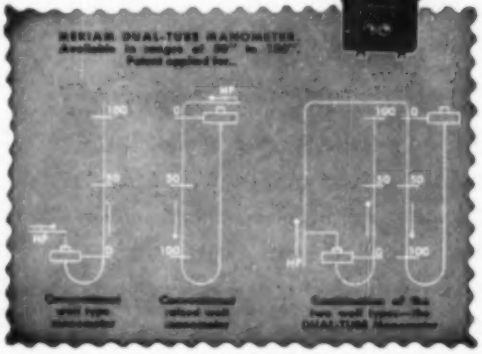
It helps avoid accidents, saves time and effort in reading. Of simple, rugged construction, it is built in accordance with Meriam standards of accuracy and sensitivity for long, reliable service. Ask for Catalog Sheet M-100WM.

THE MERIAM INSTRUMENT COMPANY

10916 MADISON AVENUE • CLEVELAND 2, OHIO

WESTERN DIVISION: 960 Mission St., South Pasadena, Calif.

IN CANADA: Peacock Bros., Ltd., Montreal



IN AIR CONDITIONING
it's the
COMPRESSOR THAT COUNTS

Since 1933, Westinghouse has pioneered the hermetically-sealed compressor design in air conditioning. Today *only* Westinghouse can offer you this successful principle in *all* of its models, backed by 17 years of successful installations.

The Westinghouse Hermetically-Sealed Compressor is your guarantee of years of economical, trouble-free service. There are no belts to break or pulleys to adjust, no shaft seal refrigerant leaks. Reduced size and modern design lessen vibration and noise. Entirely enclosed in a steel shell, its refrigerant-cooled motor requires no ventilation and is protected from dirt, dust and moisture.

Whether you are considering a self-contained unit or a complete system, the compressor will make the difference. By choosing Westinghouse, you are assured of the benefits of hermetic sealing in *every* size.

YOU CAN BE SURE...IF IT'S
Westinghouse

J-80179

FIRST to introduce
HERMETICALLY-SEALED
COMPRESSORS IN
AIR CONDITIONING

When you're looking for

LEAD PIPE

to keep corrosive chemicals in line

The chemical industry relies on lead pipe to convey corrosive materials.

It relies on National Lead to supply this pipe in the proper form and alloy for each specific application.

National supplies lead pipe in several grades and types as well as in all weights and sizes.

The grades include chemical, antimonial, tellurium, tellurium-antimonial. And the new Nalco Metal for chromium platers. All are made from "St. Joe chemical lead."

For installations requiring extra structural strength, National makes "United" and "United Tubond" lead-lined pipe and fittings. Both combine the corrosion resistance of lead with the strength of steel. All linings are seamless, smooth bore, and of uniform wall thickness.

When you buy lead pipe, specify National—and take advantage of metal resources, mechanical equipment, and production facilities that are unmatched. National has manufacturing plants in all principal cities.

...look to the Leader in Lead

...in everything from lead pipe...valves...sheet...and lead-lined or lead-covered equipment...to complete acid recovery plants.

NATIONAL

LEAD COMPANY

New York 6; Atlanta; Baltimore 3; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; Philadelphia 25; Pittsburgh 12; St. Louis 1; Boston 6 (National Lead Company of Mass.); Los Angeles 23 (Morris P. Kirk & Son, Inc.); Toronto, Canada (Canada Metal Co. Ltd.).

Trademarks
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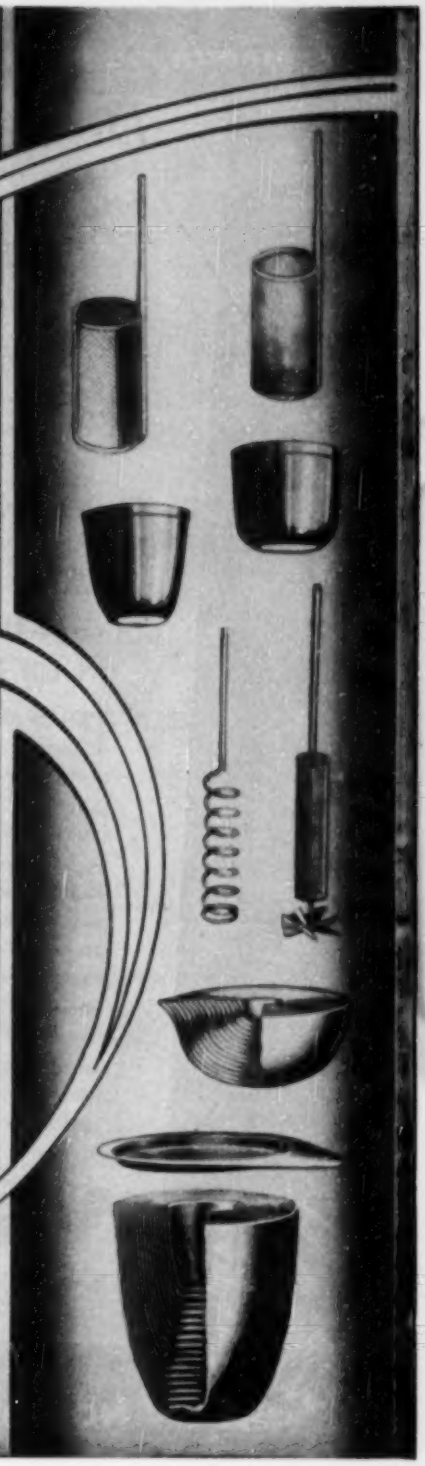
BAKER Platinum Laboratory Ware

Tested by Use

We have been manufacturing platinum laboratory ware for almost three quarters of a century and during that period have done much to bring this ware to its present exactness and high state of development. We introduced platinum-rhodium alloy laboratory ware, which is now so highly regarded, and such design changes as our reinforced rim crucibles and dishes and the Baker Low Form Crucible.

Because, naturally, our large scientific laboratories use apparatus manufactured by us in their own work, Baker Laboratory Ware is constantly subjected to continuous tests through use and so we are enabled to detect the need for improvements. An example was our observation of the tendency of stationary type electrodes to break at the junction of stem and cylinder, a fault which we overcame by reinforcing this joint.

Let us send you a copy of *Data Concerning Platinum*. It tells about our products and is a very valuable reference work too.



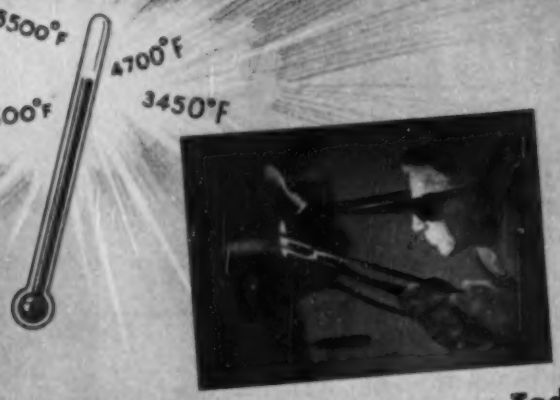
BAKER & CO., INC.

113 Astor St., Newark 5, N. J.

NEW YORK SAN FRANCISCO CHICAGO

For research . . . for production . . .

TEMPERATURES *TWICE* THE MELTING POINT OF STEEL!



Industry Uses These Temperatures Today . . . with Norton-Developed Refractories

TEMPERATURES as high as 4300° F. for sintering carbides . . . up to 4700° F. in the manufacture of acetylene . . . even up to 5500° F. in certain research projects . . . that's the trend in industry today, toward higher and higher temperatures.

High temperatures call for special refractories in which Norton Company has been pioneering for 36 years. As in many industries, the process industry also is turning to Norton for special refractories to handle today's super temperatures. Outstanding in high temperature operations are Norton's pure oxide refractories of thoria, zirconia, fused magnesia (MAGNORITE*) and fused alumina (ALUNDUM*).

In addition to handling super temperatures in process plants, Norton refractories are handling heat for many industries—metal; ceramic; power and gas generating.

*Trade-mark reg. U. S. Pat. Off.

The main Worcester plant of Norton Company

NORTON REFRACTORIES LIKE HEAT

NORTON COMPANY, WORCESTER 6, MASS.

Chemical carrier Marine Chemist after conversion by Bethlehem. Inset shows a filling and discharge station on the R. E. Wilson, another Bethlehem conversion.

Sea-Going Carriers for ECONOMICAL Transportation of Liquid Chemicals in Bulk

Bethlehem's leadership in the conversion of sea-going tankers to modern chemical carriers is one of the many examples of Bethlehem's ability to meet the specific requirements of the individual operator or an entire industry through the transformation of already existing facilities. With demand for plastics ever increasing, the chemical industry was faced with the problem of transporting—economically, swiftly and safely—bulk shipments of caustic soda, glycols, solvents and other organic compounds from primary sources of supply to the major distribution areas. Complicating factors included necessity for preventing contamination and solidification of cargoes in shipment, for providing separate pumps and pipe lines for a wide variety of products, and for developing tank linings which would resist chemical action. Solution of these problems in the conversions of the *Marine Chemist* and the *R. E. Wilson* represent excellent examples of how Bethlehem can help you solve your problems—however complex—of obtaining the most economical means of transporting bulk cargoes by water.

If you are interested in obtaining detailed information regarding the chemical carrier and other waterborne craft suitable for economical transportation of special liquid cargoes, please write to the address listed below or inquire at your nearest Bethlehem Yard.

SHIP REPAIR YARDS

Boston Harbor	New York Harbor
Baltimore Harbor	Beaumont, Texas
Los Angeles Harbor	San Francisco Harbor

SHIPBUILDING YARDS

Quincy, Mass.	Staten Island, N. Y.
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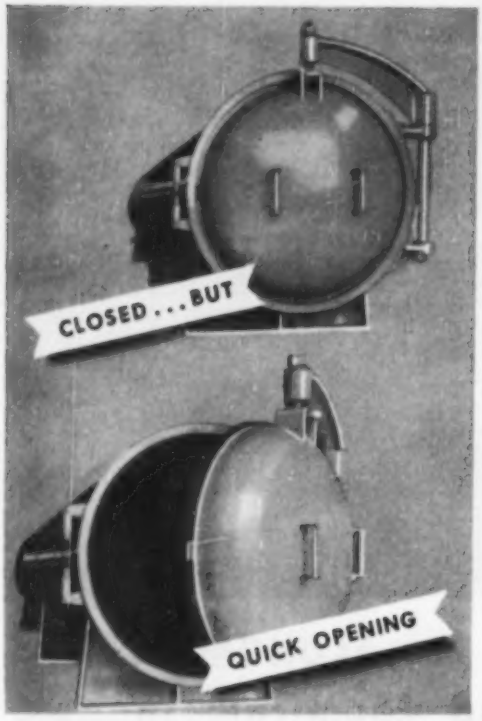
SHIPBUILDERS *SHIP REPAIRERS*

BETHLEHEM STEEL COMPANY

Shipbuilding Division

General Offices: 25 Broadway, New York 4, N. Y.

On the Pacific Coast shipbuilding and ship repairing are performed by the Shipbuilding Division of Bethlehem Pacific Coast Steel Corporation



Look into this in a Hurry!

Blaw-Knox Quick Opening Doors for curing chambers, vulcanizers, and similar equipment, are *quick—tight—boltless.* In diameters up to 10 ft., they may be used on pressures up to 250 psi. They are boltless and rim-locking.

This is only one of a long line of Blaw-Knox standard equipment items for the Process Industries. See Blaw-Knox Bulletin No. 2307.

•

PROCESS EQUIPMENT DEPARTMENT

BLAW-KNOX

DIVISION OF BLAW-KNOX COMPANY

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Whether you need THIS —or THIS

You can get what you want in the complete range of Jones Herringbone Speed Reducers

YOU will find this 128-page catalog of Jones Herringbone Speed Reducers helpful in the selection of reducers in accordance with A.G.M.A. recommended practice for all conditions of service. Jones Herringbone Speed Reducers are built in single, double and triple reduction types and in every standard ratio in ratings ranging from 1.25 H.P. to 440 H.P.

All these reducers have heat treated gears, ground shafts and are mounted with anti-friction bearings throughout. Liberal stocks are carried to facilitate shipments.

Catalog No. 70 will save you time and effort in laying out drives that call for Herringbone gears.

WRITE FOR YOUR FREE COPY

W. A. JONES FOUNDRY & MACHINE CO., 4415 Roosevelt Rd., Chicago, Ill.

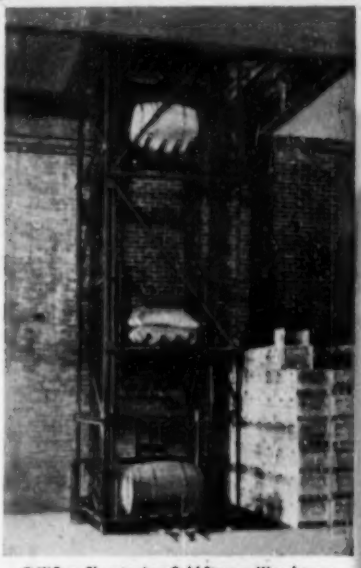
Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • PULLEYS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

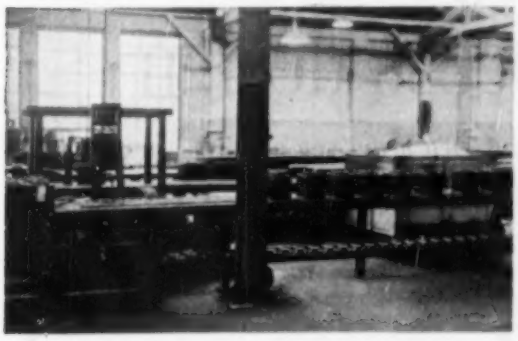
GOODS OUTPUT GOES UP...

when G-W'S on the job

For instance: The G-W Tray Elevator provides a continuous flow between floors—handles uniform loads, or a wide variety of sizes and shapes . . . barrels, boxes, bales, crates, bags, or what have you. Loading and unloading is automatic.



G-W Tray Elevator in a Cold Storage Warehouse.



G-W Assembly Conveyor. Steel plates on chains form a smooth, continuously moving table.

And *on the level,* a G-W Conveyor "highballs" goods from receiving to shipping to storage or, if you like, "slow-flows" products from one operation to the next for processing or assembly. Meantime, labor is released for other jobs; production runs smoothly, without confusion; goods output goes up; and, most important . . . *costs come down substantially!*

Most of your material handling can be performed by standard G-W Conveyors and elevators, designed for low-cost operation. If your problem is unusual, whatever its nature—horizontal, inclined or vertical conveying—G-W will design a system to your specific requirements which will handle your products faster, cheaper, easier. Consult a G-W engineer today!

GIFFORD-WOOD CO.

SINCE 1814
Factory: Hudson, N. Y.

G-W HANDLES IT...
faster · easier · cheaper

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in process design

these Lummus men bring you a world of experience

The Lummus man responsible for the process design of your project has had more than fifteen years' experience in design, development and operation. He holds a master's degree in Chemical Engineering from a leading university or engineering college. His background includes refinery operation, maintenance and construction along with process design engineering.

Noteworthy projects that have widened his Lummus' experience are: the 2 world's largest synthetic rubber projects; the 13 complete aviation gasoline plants; over 60 solvent refining lube oil plants, and the many thermal cracking, polyforming and coking units.

His background is worldwide. Currently, he is at work in England, Egypt, France, Sweden, Venezuela, and across the United States. He serves on technical committees, lectures on refinery and chemical engineering practice, and writes technical papers. His viewpoint is broad and practical.

The Lummus Process Design Engineer—trained to work with molecules—is equally well equipped to work with people. You will find him keenly aware of the gains that come from co-operative interchange of information with your own technical staff. He contributes in large degree to the satisfactory relations that exist between industry and Lummus.

THE LUMMUS COMPANY
420 Lexington Avenue, New York 17, N. Y.

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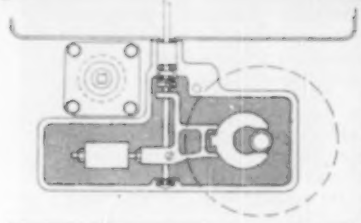
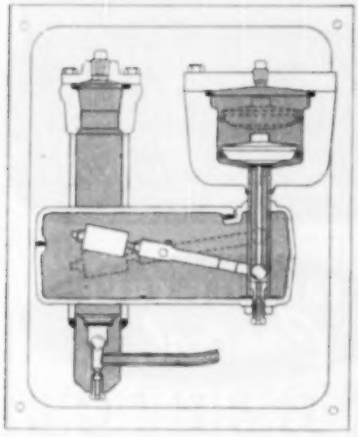
MORE ACCURATE . . . *because it has* MORE POWER *and Less Friction*

The HAYS-PENN MAGNA-CLUTCH MECHANICAL FLOW METER





For HIGHEST ACCURACY

Maximum Power, greatest mercury displacement because of largest float (3.75 in. diam.) and longest float travel (1.5 inches).

Minimum Friction, independent of working pressure because of elimination of pressure-tight bearing, internal knee bearing and shaft end-thrust bearing.

Highest ratio of power to friction.

Precise calibration check at 50 percent of differential available at extra cost.

For LOWEST MAINTENANCE

Manometer accessible without disconnecting piping.

Only one internal moving part (the float).

No bearings to service.

Mercury volume not critical.

Manometer level not critical.

Mercury easily drained.

Positive mercury check valves.

For COMPLETE SAFETY

No leakage possible of inflammable, explosive, or toxic fluids because of no pressure-tight bearings.

For UTMOST FLEXIBILITY

Field adjustable for any differential range:

35" tube from 17" to 35" water
100" tube from 50" to 100" water
200" tube from 100" to 200" water
400" tube from 200" to 400" water
750" tube from 400" to 750" water
1500 or 2500 PSI working pressure

For SPECIAL FEATURES

Any meter may be furnished with any or all of the following features:
Dual (wide range) recording pen.
Simple, accurate integrator.
Temperature and/or pressure pens.

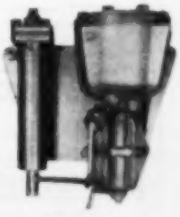
Worth Reading

The Hays Corporation, Michigan City 9, Indiana

THE HAYS CORPORATION
COMBUSTION & INDUSTRIAL INSTRUMENTS & CONTROLS
MICHIGAN CITY, INDIANA, U.S.A.

HAYS-PENN *Electric* **FLOW METERS**

1000 P.S.I.



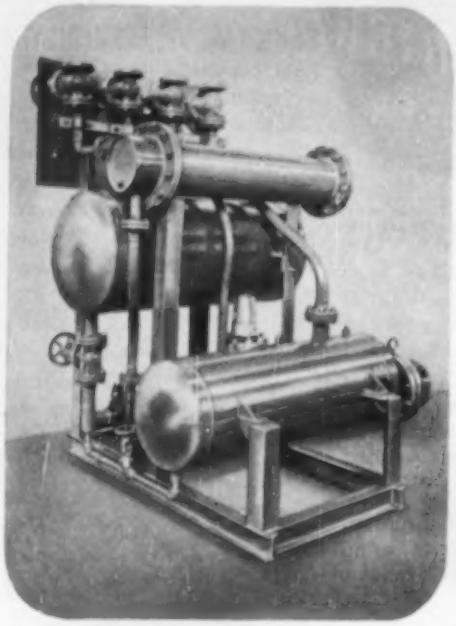
2500 P.S.I.

AREA METER 2" and 4"

LOW PRESSURE

SEND FOR BULLETIN 49-915

SELF-CONTAINED DOWTHERM HEATING AND COOLING SYSTEMS FOR THE PROCESS INDUSTRIES



Save time—save installation difficulties—get immediate operation and use. A Blaw-Knox compact, self-contained Dowtherm heating and cooling unit comes to you in one package ready to connect to water and power supplies without further assembling. Installation is quick—simple—inexpensive.

Blaw-Knox standard pre-engineered and pre-proved equipment for the Process Industries includes a long line of major devices. Learn about the others. See Blaw-Knox Bulletin No. 2307.

PROCESS EQUIPMENT DEPARTMENT

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McDONNELL NO. 65 ELECTRIC CONTROLLER

Underwriters' Approved for Hazardous Locations

A complete float-operated electric controller for water tanks, receivers and other liquid storage systems that can be used under conditions where a conventional type is not applicable. Can be used to "make" or to "break" electrical circuits at either high or low liquid levels — for example, controlling motors, signal lamps, electrical elements, etc. Underwriters' tested and approved for use under the following hazardous conditions:

Class I, Group C—Atmospheres containing ethyl-ether vapors, ethylene, or cyclopropane.

Class I, Group D—Atmospheres containing gasoline, petroleum, naphtha, benzine, butane, propane, alcohols, acetone, benzol, lacquer solvent vapors, or natural gas.

This control is built to the high standards of quality throughout, and incorporates McDonnell packless sylphon construction, with heavy duty mercury switch. Body pressure, 40 lbs; tapped for 1" pipe top and bottom.

Ask for circular and service recommendation covering your particular conditions.

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Constant Temperature Regulation for

- HOT WATER TANKS • PASTEURIZERS • PRE-HEATERS
- STORAGE ROOMS • VATS • PLATING TANKS
- COOKERS • FEED WATER HEATERS • WATER JACKETS

Cut your processing costs to a new low with the Trerice Self-Operating Regulator. This dependable, experience-proven regulator provides trouble-free control . . . eliminates over-heating! Saves you steam, fuel and labor while affording improved "quality control" over your product. Your low, initial investment in the Trerice Self-Operating Regulator and its companion piece, the Trerice Dial Thermometer, will be repaid many times over during their first year of service.

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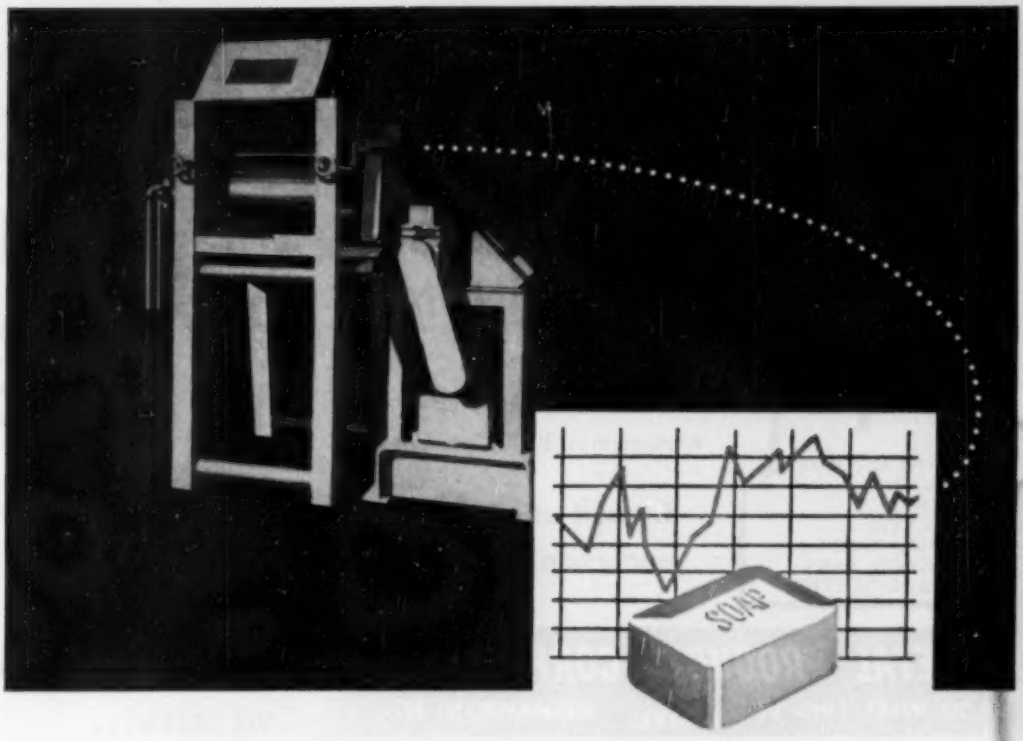

Crystal Gazing—1950 Style

One of America's largest producers of beauty soap decided to pre-test proposed new drying machinery to determine the most satisfactory equipment to use. Lukenweld was called on to design a "pilot" machine capable of adjustment to varying drying conditions, and which could be developed later into full-scale production machines. The result was this laboratory-sized drier and flaker. To test corrosion-resistant characteristics, one of its two rolls and the hood are solid stainless steel; the other roll, solid Inconel; the frame panels, stainless-clad steel. To test variations in process, its speed, gap and doctors are adjustable. Welded construction permits inexpensive alterations in design.

Maximum product dependability with minimum cost are the result of years of experience of Lukenweld engineers working with steel plate. Higher predictability, improved appearance, resistance to shock, reduced weight, increased strength and rigidity, more flexibility of machine design, reduced production costs and elimination of patterns usually result from the use of Lukenweld construction. Here at your disposal are Lukenweld's knowledge of machine design, construction and installation . . . plus Lukens 140 years of experience in developing and producing specialty steels.

If you are considering new cylinder drying machinery, processing machines or other finished units, write Lukenweld, Division of Lukens Steel Company, 400 Lukens Building, Coatesville, Pennsylvania.

Improved machinery for improved processes through engineering

LUKENWELD

A DIVISION OF LUKENS STEEL COMPANY

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in STAINLESS
or ALUMINUM

5 to 150 gallons
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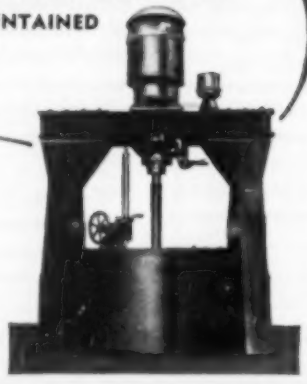
AUTOMATICALLY MAINTAINED
SPEEDS PRODUCTION



*"CENTROID" SPEED CONTROL IS EXCLUSIVE WITH

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FLETCHER CENTRIFUGALS
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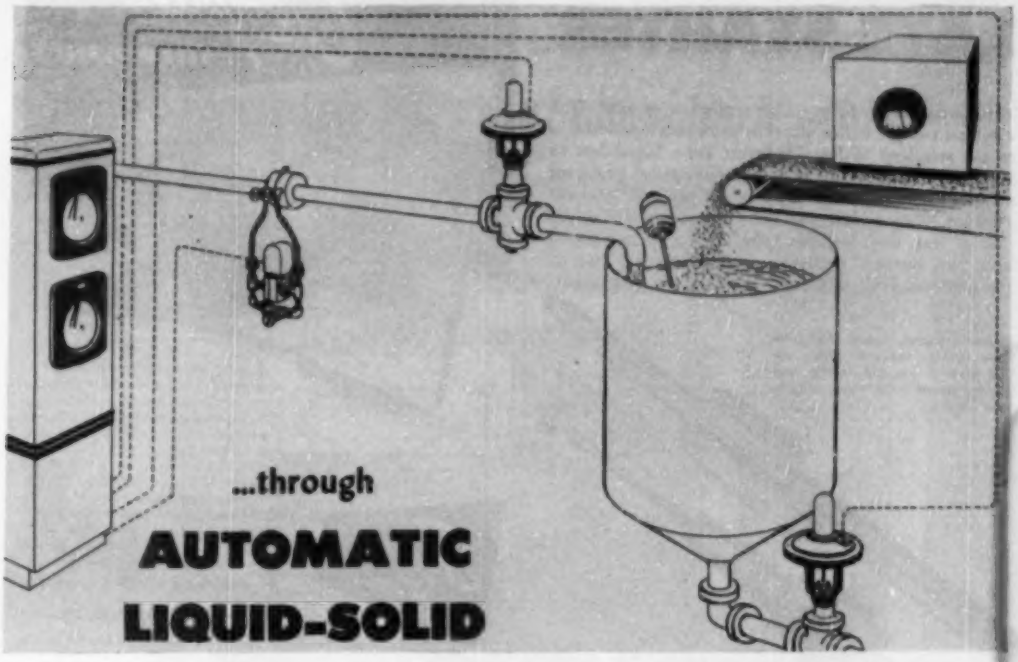
NEW OPPORTUNITIES in continuous processing



RATIO CONTROL...by Foxboro

Many a troublesome batch process can be converted to continuous operation — with resulting economies and product improvement — by installing Foxboro Liquid-Solid Ratio Control. This simple, accurate system has been thoroughly proved in use on such processes as the extraction, dissolving, or reaction of materials.

Typical examples include the proportioning of acid feed to phosphate rock in the production of phosphate fertilizer, and the proportioning of water to the feed of crossettes (ground beets) in the production of beet sugar. *Wherever ratio-ing the quantity of liquid reagents to a varying rate of solid chemicals being delivered by a conveyor belt is desirable, this fully automatic system simplifies the operation and improves the efficiency of the process.*

In this system, a Foxboro Recording Controller receives a continuous measurement of weight of the solid material (from a Foxboro Pneumatic Motion Transmitter incorporated in a Merrick Weightometer located above the conveyor belt), and also receives a continuous measurement of liquid flow from a Foxboro d/p Cell or mercury manometer. The desired ratio between solid and liquid can be readily set by a dial in the instrument which, in turn, controls the liquid flow.

The efficiency-boosting advantages of Foxboro Ratio Control are now being realized by a number of leading companies. If you have a similar problem, learn how these advantages may be achieved for your plant. Write for engineering data. **The Foxboro Company, 16 Neponset Ave., Foxboro, Mass., U. S. A.**

This illustration shows Foxboro Ratio Control at a large beet sugar plant. A Merrick Weightometer equipped with a Foxboro Pneumatic Motion Transmitter appears in the foreground.

FOXBORO REG. U.S. PAT. OFF. **COORDINATED CONTROL**

DON'T BE A LATE STARTER

1950 promises to be a tough, competitive year. One way you can get a fast start on profitable operation is to use standard Wilson-Dudgeon Tube Expanders to help solve your production or maintenance problems on tubular apparatus. Backed by 97 years of solid experience, Wilson-Dudgeon Tube Expanders will assure you of fast, easy, reliable tube rolling to cut down-time and increase production-time. Here are two of the profit-making Wilson-Dudgeon Tube Expanders:

Wilson-Dudgeon Model 38 Tube Expander for tubes 1" O.D., up. Self-feeding, parallel rolling and flaring action seats tubes quickly and solidly.

Wilson-Dudgeon Model 41 Tube Expander, parallel rolling, self-feeding with ball bearing thrust collar for rolling heat exchanger tubes ½" O.D. to 2½" O.D., into tube sheets to 6".

No matter what your tube expander problem, you can be sure of getting a Wilson-Dudgeon Tube Expander that will fit your specific application. Write us, giving full details or send for Bulletin 380.

CUT FUEL COSTS *with* WILSON TUBE CLEANERS

Remember—$\frac{1}{16}$" of scale often wastes 10%, or more, in fuel. A Wilson Tube Cleaner makes short work of the toughest deposits . . . cleans both ferrous and non-ferrous straight or curved tubes. Air, steam, water or electrically driven cleaners available for tubes ¾" I.D., to the largest ever cleaned. Write for Bulletin 47-A.

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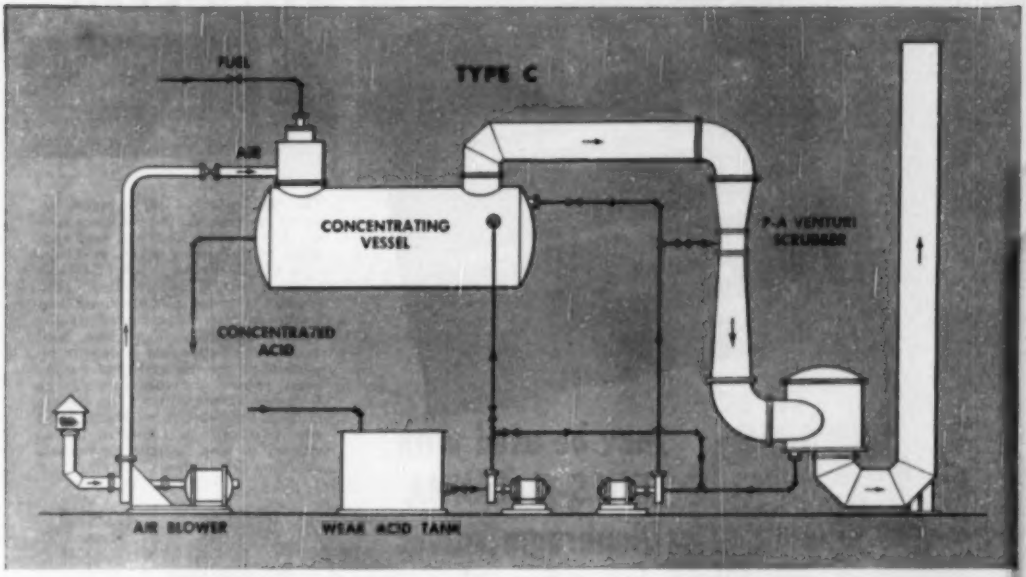
Chemico Announces

NEW HIGH TEMPERATURE CONCENTRATOR

for spent sulfuric and phosphoric acids



THE NEW TYPE C High Temperature Acid Concentrator is a major improvement on the well known Chemico Drum Type Concentrator. This new unit is specially designed for concentrating spent sulfuric acid from petroleum refining, alcohol synthesis and nitrating operations as well as phosphoric acid from triple superphosphate operations.

The Type C unit employs the same principle as the Drum Type. Hot combustion gas is released under the surface of the acid where it gives up most of its heat and emerges at a temperature slightly above that of the acid itself. The combustion of the fuel takes place in the dip pipe, which withstands a high temperature on the *inside* and the corrosive action of acid on the *outside*.

But the new Type C Concentrator uses combustion gas at 2500F instead of 1100F. This high-temperature operation provides greatly improved heat efficiency. It also produces a much smaller volume of gas to be scrubbed at the concentrator exit. Here Chemico utilizes the recently developed and highly efficient P-A (Pease-Anthony) Venturi Scrubber which eliminates up to 99% of acid mist.

SEND FOR CHEMICO BULLETIN S-112, which fully describes this new Type C unit as well as the Type S Concentrator for acids containing soluble salts.

ADVANTAGES OF THIS NEW CHEMICO UNIT

1. Use of high temperature combustion gas assures high heat efficiency.
2. Retains the best features of the Chemico Drum Type Concentrator.
3. Low initial investment.
4. Low operating cost.
5. Low maintenance cost.
6. Acid concentration through all ranges of strength up to 96%.
7. High acid recovery.
8. Built-in fume eliminator (P-A Venturi Scrubber).
9. Specially adapted for use on acids containing salts as, for example, waste pickling solutions.
10. No heat transfer surfaces to coke up.
11. Fully guaranteed by Chemical Construction Corporation who have more than 35 years of experience in this field and a background of more than 200 successful concentrating unit installations.

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CC-198

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- ✓ Air loaded pneumatic motors
- ✓ All double and single action air cylinders
- ✓ Mechanical springs

may be used with HILLS-McCANNA Diaphragm Valves for automatic or remote operation

The extreme flexibility of Hills-McCanna diaphragm valves makes it possible to satisfy virtually any preference or requirement in the use of mechanical operators. All of the operators listed above plus others are applied to standard Hills-McCanna sliding stem valves to provide complete units that utilize your existing operating methods.

Designed especially for conveying "hard-to-handle" fluids such as acids, alkalis, volatile and viscous substances, slurries, semi-solids, etc. Hills-McCanna diaphragm valves give you the advantages of "special" design on a standardized basis. Sizes range from ⅜" through 14" (not all methods of operation are available in all sizes); pressure up to 150 psi; temperatures to 180°F. (some applications to 220°F.). Write for complete information, HILLS-McCANNA CO., 2341 W. Nelson Ave., Chicago 18, Ill.

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Saunders patent diaphragm valves

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Force-Feed Lubricators • Magnesium Alloy Castings

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The Fabrication of Alloy Metals requires exacting, skillful workmen with the skill to shear, form and weld each metal with unerring precision. Littleford has fabricated such metals as Stainless Steel, Monel, Everdur, Nickel, Inconel, Herculoy and Aluminum into hundreds of products used by the Process Industries. Experience, plus modern equipment and a definite responsibility for the quality of the finished product are assurance of the finest workmanship. If you have a problem involving Alloy Metals, send your blueprints to Littleford for an estimate of cost, or write for Bulletin on Alloy Fabrication.

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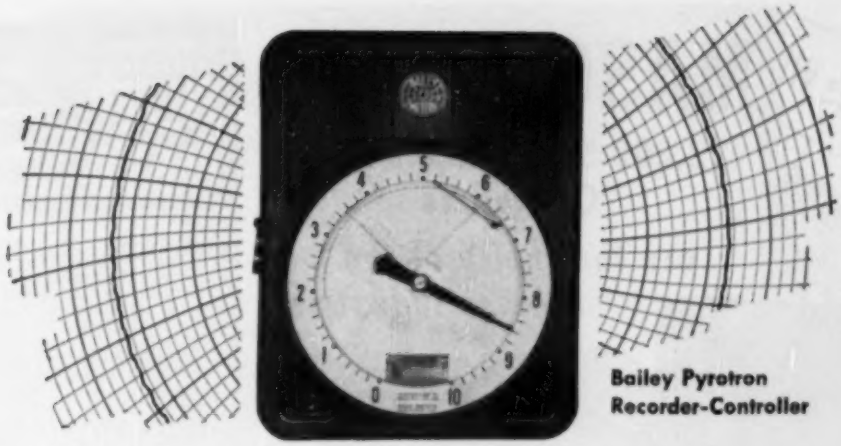

Bailey Pyrotron
Recorder-Controller

Looking for Better Temperature Instruments?

...Then check these features of Pyrotron Electronic Resistance Thermometers...

FUNDAMENTAL ACCURACY

Bailey Pyrotron Resistance Elements are made of highest purity platinum—the material used by the National Bureau of Standards in establishing basic standards for temperatures from −190°C to +660°C.

THREE TYPES OF CONTROL

Pyrotron Controllers may operate: on-off electrical systems by either electronic relays or electric contacts, modulated electronic systems, or air-operated systems. Two temperatures may be recorded on the same chart and controlled by a single instrument.

FACTS PUT INTO USABLE FORM

Bailey Pyrotrons may be arranged to put temperature facts into convenient usable forms. If two or more temperatures are related, they may be recorded as continuous records on the same chart for easy comparison. The average of several temperatures or the difference between two temperatures may be recorded as a single continuous record which may be retransmitted to a distant point or used to actuate a control system.

EASY INSTALLATION

Bailey Pyrotrons do not require careful leveling or protection against vibration. Three ordinary copper wires are all that is needed to connect each temperature sensitive element with the recorder. Power may be taken from any 115 volt 60 cycle circuit.

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ABUNDANT POWER

A separate motor drive for each temperature furnishes abundant power to operate a recording pen, a controller and an alarm switch.

For the full story on this unusual electronic resistance thermometer which is suitable for ranges between −300°F and 1200°F, ask for Bulletin No. 230-C. P-21

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Controls for Processing

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Masoneilan 12,000 Series displacement-type level controllers provide positive, accurate liquid level control. They are available in a wide choice of standard ranges from 14 inches to 15 feet. They meet practically all requirements for liquid level control including interface service and remote level indication. Write for information.

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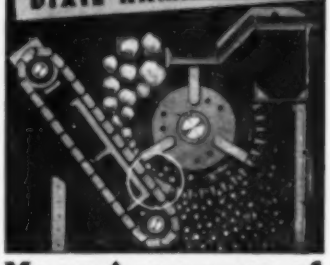

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75 pounds in a single stage.

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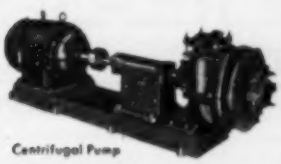
For complete information on General Ceramics Stoneware Pumps write for Bulletin 211 . . . for additional information on General Ceramics Stoneware Exhausters, Bulletin RA. Why not let a General Ceramics engineer show you how Chemical Stoneware equipment (Ceraware) Porcelain (Cerawite) can solve your corrosion problems. Write for Bulletins CHER-3 and POR.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172	100	9x8	IR-CPT-SULLIVAN
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5—Baker Perkins double arm Mixers, 300 gals., sigma blades.
1—Patterson nickel lined Blender, 192 cu. ft. cap., w/20 HP motor.
3—J. H. Day Mogul type Mixers, 2½ gallons and 5 gallons.
5—Simpson #3 Intensive Mixers (New).
1—Bird Suspended type Centrifuge, 40" S.S. perforated basket with motor.
1—Tolhurst Suspended type Centrifuge, 40" rubber perforated basket.
1—Podbielniak SS Centrifugal Extractor, Model 5080.
10—Sharples Super Pressure Centrifuge, with 3 HP, Expl. proof motors.
1—Sharples Super Pressurite Centrifuge, SS Bowl, Model 18V.
1—A T & M Suspended type Centrifuge, 30" SS perforated basket, with motor.
1—Royle #1 Perfected Extruder, with heating unit.
1—Allis Chalmers Ball Mill, 5'8"x10', Silex lined.
3—Hardinge Conical Ball Mills, 6'x36", 5'x22", 6'x22".
1—Abbe Engineering Silex lined Pebble Mill, 6'x12'.
1—Farrell-Birmingham, 3-roll Rubber Mill, 72".
1—Mikro Pulverizer #4TH.
1—#4 Mikro Atomizer, Stainless Steel, w/20 HP motor.
1—Mikro Pulverizer, #2TH.
1—Mikro Pulverizer, #1SH.
1—Ball & Jewell Rotary Cutter, #½.
1—Ball & Jewell Rotary Cutter, #3.
1—Ball & Jewell Rotary Cutter, Lab. Type.
3—Orville Simpson Rotex Screens, #4'.
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3 Bartlett & Snow Co. Stainless Steel T347 Reaction Kettles, approx. 1000 gal: 8' dia. x 3' deep, dished bottom, open top with flat bolted cover; direct fired, gas burners available; heavy duty agitator with bearings, spur gear drive, Cleveland worm gear reducer and 25 HP 3/60/220-440 4-speed motor.

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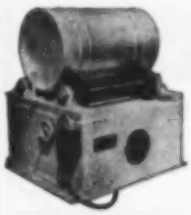

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2—Kelly 40" x 40" P&F, 40 chambers, C. I.
12—Shriver, Sperry Stainless, 18" to 42".

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3—Rotex #82 Double Deck 40"x120", all stainless.
2—Day #01 Single Deck 40"x120", 40"x84".
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1—Patterson 6' x 8' Jacketed Pebble Mill.
12—Abbe Buhrstone lined Pebble Mills 5' x 6', 4½' x 5', 3½' x 4', 3' x 5', 2½' x 4'.
2—Steel Jacketed Ball Mills 4' x 8', 3½' x 4'.

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4—Mikro Pulverizers #4TH, #2TH.
1—Jeffrey 36" x 60" 10" x 24" Hammer Mills.
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1—U. S. Colloid Mill Stainless Steel 5 HP.
New 9"x12" Lab. Mixing Mills & Calendars.
12—Sharples Centrifugals #15A Stainless & #6.
4—French Oil 400 Ton Linseed Presses.
1—Century 2 HP, 4 speed vert. Mixer.
2—"Master" drum type Blenders 1000#, 3 HP.
10—Dry Batch Mixers 50, 100, 200, 400, 600, 1000, 1200 & 2500 lbs.
4—Rotex Sifters 20"x40" to 40"x84".
1—Fawt 150 gal. Jack. Steel Spiral Mixer.
5—Atmospheric Dryers or Ovens. Gas Red. Tray & Truck type. Many sizes.
4—Stokes & Day Powder Filling Machines.
1—Hanson & automatic vac. Bottle Filler.
Stainless, Alum., Copper & G.L. Kettles.
15—Stainless Steel & Glass Lined Storage Tanks.
2—Mikro #1SH Pulverizers 3 H.P. Others to 50 H.P.
1—Quriner 5"x2" Centrif. Pumps.
2—Abbe Pebble Mills 6'x6' & 5'x5'.
6—Jar Mills Lab. to 8 gal.
1—Stedman & Sprout-Waldron Crushers.
1—Sturtevant 30" Rock Emery Mill.
1—Robinson #10 Saw Tooth Crusher.
3—#30 & #3000 Raymond Mills. Also Low and High Side Mills.
2—DeLaval Multiple Clarifiers, #300 & 301.
6—Simpson Intensive Mixers 20 to 3½.
1—Sprout-Waldron 19" Ball Bearing Attrition Mill, two 7½ HP motors. Also other sizes.
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1—Double Roll Crushers, 10" dia. x 14" face.
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Soap Machinery for Toilet, Laundry, Chip, Liquid.
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Steam Tube: Louisville, Allis-Chalmers.
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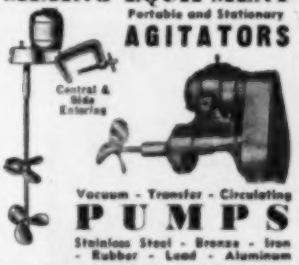

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Stokes R3 Tablet Press
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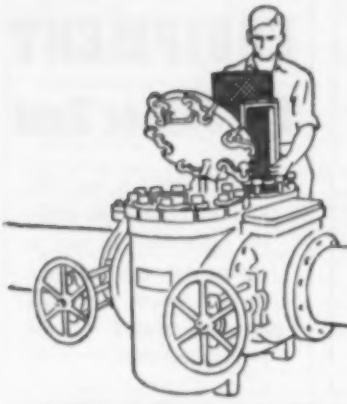
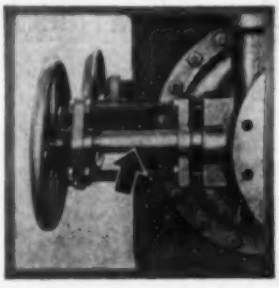


THE NEW
Elliott
TYPE A
TWIN STRAINERS

SHOWN on this page are a few of the many new, striking advantages in these new Twin Strainers. Other features include steel doors, crack-proof and quick-opening . . . provision for adding a "wearing-plate" to handle extremely corrosive water . . . provision for adding chain drive or valve interlock, without dismantling valves . . . and other features to provide maximum economy in non-stop straining.

Elliott Twin Strainers are available in sizes 1" to 24" for 125 lb. pressure and 1" to 12" for 250 lb. pressure. Full details in the interesting new bulletin, on request. Mail the coupon.

LARGER CAPACITY BASKETS — approximately 5 to 1 ratio with standard mesh. Larger baskets make fewer cleanings necessary.



QUICK-VISIBLE VALVE POSITION INDICATOR cuts out all guesswork as to which straining chamber is working.

EASY-OUT VALVE DISC — Simplifies replacing of valve disc ring when it is required. No need to dismantle valve.

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Q. *Of what does Pfaudler's standard line of Stainless Steel process equipment consist?*

A. A series of engineered stainless steel jacketed reaction vessels with motor driven agitators ranging in size from 5 to 500 gallons; jacketed evaporating pans in 12, 60 and 150 gallons; heat exchangers and condensers in various designs and capacities.

Q. *What has guided you in designing this equipment to assure good performance?*

A. Over 20 years of engineering experience in designing all types of stainless steel chemical process equipment. The most efficient designs were selected from this experience from the standpoint of size, design, agitation, heat transfer and cost. Pfaudler pioneered in perfecting the technique of stainless steel welding.

Q. *How do you handle various requirements from standpoint of corrosion resistance?*

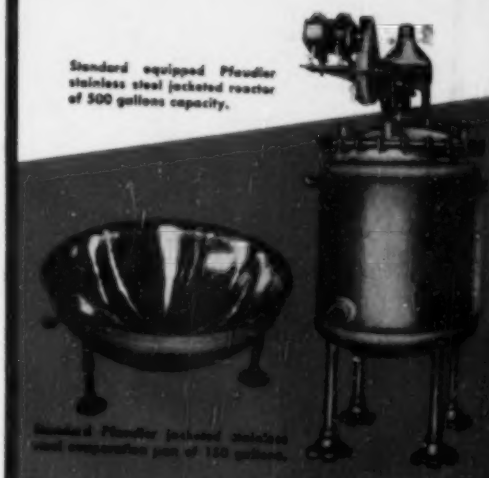
A. Stock units are made of type 316 but ample inventories are carried of types 304, 321 and 347 for quick delivery. Pfaudler also has facilities for heat treating and passivating where required.

Q. *How can I get the complete story?*

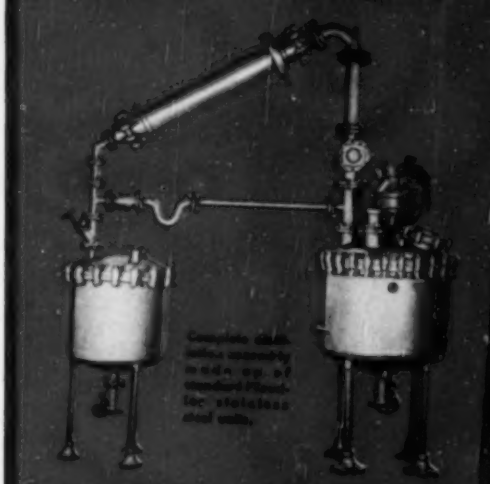
A. Ask for Bulletins 823 and 837 or call the nearest Pfaudler sales engineer.

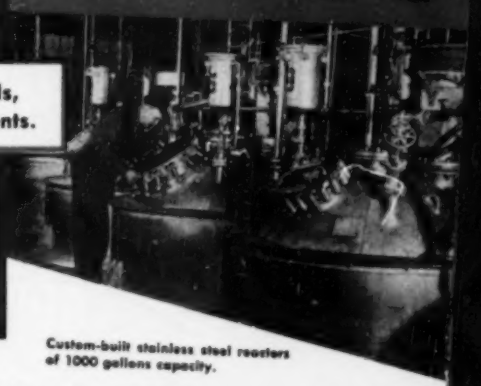
When standard designs won't answer your needs, Pfaudler engineers stainless steel to your requirements.

Regardless of the vessel you require, there are "good" and "best" ways to design and build it. Part of the answer is an engineering staff with diversified experience. That Pfaudler has in abundance *plus* complete facilities to manufacture at low cost. May we bid on *your* requirements?



Standard equipped Pfaudler stainless steel jacketed reactor of 500 gallons capacity.





Custom-built stainless steel reactors of 1000 gallons capacity.

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